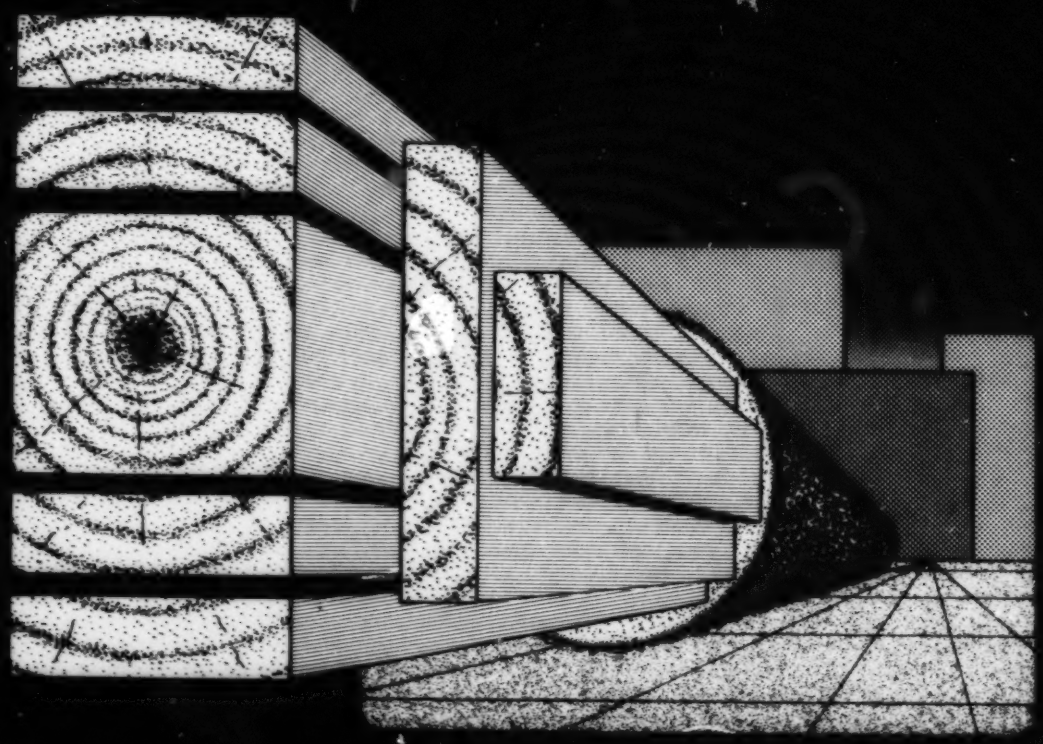
Forintek Canada Corp.

and

NEWFOUNDLAND LUMBER PRODUCERS ASSOCIATION

present

SAWMILL OPERATIONS CLINIC - 1984



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SAWMILL OPERATIONS CLINIC 1984

Proceedings of a
Sawmill Operations Clinic
held on October 30, 1984 at Gander, Newfoundland
and on November 1, 1984 at Deer Lake, Newfoundland

Sponsored by...

Federal Department of Regional Industrial Expansion

Special Publication
No. SP 22
ISSN 0824-2119 $5.00

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How to Manufacture Quality Sawlogs

F.J. Petro, Frank J. Petro Consultants Inc.

My discussion will focus on how to manufacture quality sawlogs and how to saw hardwoods.

As you can appreciate, these two subjects are both involved and complex. At best, I will attempt to present what I feel are the highlights of each and, where possible, I will try to relate these topics to the resource indigenous to Newfoundland.

In discussing how to manufacture quality sawlogs, I will emphasize the cutting of hardwoods, however, I will have a few words to say on manufacturing softwood sawlogs since other speakers will cover this species group as well. Also, since there are a number of primary products which can be cut from hardwoods, I have selected to discuss conventional sawlogs 8 to 18 feet long.

As you are aware, in many regions of eastern Canada, timber quality (especially hardwoods), has deteriorated badly over the years. There are many reasons for this, with some of the important ones being the result of past harvesting practices, infestation by insects and disease, fires, etc.

As a consequence of these factors, the days when quality veneer logs were plentiful and high quality sawlogs comprised a major part of a sawmill's supply, are long gone. Today's typical sawlogs are generally smaller, more defective and more variable in those characteristics affecting their quality.

To do an intelligent job of log making, woodworkers should be knowledgeable in all the factors affecting timber quality. Bucking decisions cannot be based entirely on log size, straightness and freedom from rot and shake. In the case of hardwoods, soundness is not the sole measure of quality. Many perfectly sound logs, free from rot and shake, will produce low-grade end products due to such defect indicators as scattered knots, insect damage, bark distortions and overgrowths. These surface blemishes frequently indicate serious interior defects in the quality zone of logs from which high grade lumber is normally expected.

Poorer quality trees are much more demanding when bucked into various roundwood products. But, irrespective of the type of products produced, specifications describing each must be followed. This, of course, is the key to producing optimum quality sawlogs. It is only by following adequate product specifications that woodworkers can maximize the value of primary wood products from a tree.

A knowledge of product specifications, of course, requires training. Unfortunately, there are many cutters throughout eastern Canada involved in cutting high-value timber who have had little training in log grading principles. Since how a log is produced has considerable bearing on its lumber output, the training of woodworkers is just as important as the training of potential sawyers or other mill personnel.

Now let me say something about the production of softwood sawlogs. In my view, log production, whether it involves softwoods or hardwoods requires the use of common sense as well as some bucking guidelines and log specification to follow.

If 16-foot lumber is most in demand, then a high proportion of 16-foot logs must be cut. However, care must be exercised in producing 16-foot logs. Not all 16-ft. logs will yield 16-ft. lumber if sweep and crook is excessive, if log ends have considerable cull or if there is too much cull located in the middle of logs.

Also, when these scalable defect indicators are contained in logs, lumber recovery and productivity can drop dramatically.

Another log manufacturing process concerns trim allowance. Trim allowance should be kept to about four inches--anything in excess is considered as overlength. The consequences of overlength on logs when sawn means an increase in nonproductive time as no usable lumber is produced.

Excess overlength can also mean a reduction in log diameter and a reduction in resultant lumber width. Lumber recovery drops as well since it is determined on the full log length. On the other hand, if there is insufficient trim allowance, then almost two feet will have to be trimmed from the ends of boards. In such cases, loss in lumber recovery can show a significantly large drop.

In the following paragraphs, I am now going to discuss a number of defect indicators and manufacturing processes which I believe are undesirable when contained in logs. I will discuss their significance and I will offer recommendations for improvement.

Sweep and Crook

Hardwood logs containing appreciable amounts of sweep or crook (such as white birch) significantly reduce average grade recovery, volume recovery and productivity. Average lumber length and width is reduced, edging and trimming time is increased and lumber is frequently subject to warp when dried due to crossgrain and abnormal wood.

As the degree of sweep and crook increases, sawing time increases due to the increased time required to position and turn the log on the carriage. Crooked logs require more space during hauling than do straight logs. They are also more difficult to debark. Crooked tree lengths should be cut into shorter log lengths to minimize sweep and crook.

Diagonal Bucking Cuts

In hardwoods, bucking cuts that are not made perpendicular to the log axis can reduce volume recovery and possibly grade recovery. For example, if a log measures 12 ft. 2 in. along one face and 11 ft. 11 in. along the opposite face, lumber produced from the shorter face will have to be measured as 11 ft. boards; thus one lineal foot of volume is lost.

Further, if the diagonal cut is severe enough, with practically no trim allowance, and the lumber from the side faces is not trimmed at the affected end, violation of the first lineal foot rule (NHLA rules) may result in dropping a potential FAS board to No. 1 Common.

Where minimum eight foot logs are involved, the same situation can automatically drop the grade from FAS to Selects because of lumber length violation.

To avoid the above problem, care should be taken to ensure that the cut is perpendicular to the log axis. Alternatively, the saw should be checked for proper sharpness to avoid it "running" in the cut.

Butt Logs Containing the Undercut

This is one of the most common and wasteful logging practices throughout the industry. The main reason why this is done is that the feller does not have to bend down as much as he would have to if the undercut was taken from the stump (Humbolt undercut).

The point of taking the undercut from the stump (e.g., veneer) is to utilize as much of the butt section of the tree as possible where the maximum amount of clear wood is located. As in the case of the diagonal bucking cuts, a lineal foot of wood can be lost in the tally from the short face if insufficient trim is provided. To avoid both lumber volume and lumber grade losses, the Humbolt undercut should be used.

Logs with Splits and Splinter Pull

There are a number of possible causes of splits and splinter pull in both hardwood and softwood logs, but the most important are probably improper felling and bucking techniques. Splits in butts of high quality hardwood logs are the most costly because they contain the most valuable wood. Potential FAS boards containing splits which exceed the length limits provided for in the grading rules must be trimmed back in order to raise the grade from No. 1 Common to FAS.

Further, subsequent drying or rugged handling of such boards can increase the lengths of residual splits to the point where grade reverts back to No. 1 Common and both volume and grade recovery are reduced. Sawing time is increased if the sawyer attempts to corner a straight split during sawing, however, this is a desirable procedure. Proper felling and bucking techniques should solve many cases of butt splitting and fiberpull.

Logs Containing Protuberances

Of all poor logging practices, the inclusion of protuberances such as burls and large branch stubs in logs affect sawmill efficiency the most. Logs containing such defects are difficult to fix into loads, to transport into the mill, to debark, and to position on the carriage.

In the case of burls (often found on yellow birch), they can be very troublesome from the debarker to the chipper. They also require the use of expensive machinery in the mill to cut them off. All log protuberances should be cut flush with the log surface using a chainsaw before entering the sawmill.

Cull Midway Between Ends of Logs

When major cull is contained midway between the ends of a short hardwood or softwood log the result can be disasterous. If lumber on either side of the cull portion does not meet the minimum length requirements of the NHLA rules, it is not salable, and both material and sawing time are wasted. Although some value can be recovered as chips, it does not come close to paying for all the costs incurred in producing and transporting the log to the mill.

Also, if such logs are scaled in a deck and the ends appear sound, they are given full scale as there is no scale reduction for hidden cull. Log lengths should be selected which facilitate the removal of cull sections in a tree stem by jump cutting.

Logs with Cull Ends

Regardless of species, logs with a cull end will not produce full-length lumber. Since the cull end is sawn into lumber, and the cull must be trimmed off each board, it represents nonproductive time and reduces productivity.

Cull ends should be trimmed back in the woods in short sections until at least 50 percent of the exposed end is sound. If the log is small and knotty, even more should be trimmed off. To assist woodworkers to produce better quality logs, the following guidelines are offered.

Rule of Thumb Guidelines for Making Logs

- Train logging crews in the procedures and use of product grade specifications which will produce the maximum procurable volume and quality from each tree.
- Know how to recognize the various types of tree quality characteristics and their acceptability for the various products considered. At all times, consider the market requirements for your products.
- Keep stumps as low as the quality of the wood in the stump will permit.
- If at all possible, use the Humbolt undercut during felling.
- In cutting back cull ends, keep long butts as short as possible.
- Buck logs at the grade break or the minimum diameter for the best log grade.

- Try to concentrate defective stem portions in lower grade logs and clear stem portion in higher grade logs. Follow the log grade specifications.

- If the tree stem is straight, produce the longest possible length logs without sacrificing log grade.

- Establish uniform trim or broomage allowance for bucking--four inches is a safe amount.

- Reduce the effect of sweep or crook by cutting these portions of a tree stem into shorter straighter logs.

- Buck forked trees so as to utilize as much of the tree as possible. It is not a good practice to include part of the fork on the top end of the log.

- Remove all log protuberances by cutting them off flush with the log's surface.

- Make the bucking cuts perpendicular to the log axis.

- Do not include cull sections between the ends of a log.

- Do not cut hardwood sawlogs (for a conventional mill) under eight ft. or over 16 ft.

- Keep surface and ends of logs as clean as possible during logging to reduce saw maintenance costs and reduce mill recovery and productivity.

The Importance of Proper Saw Maintenance

D. Clark, Instructor, Maritime Forest Ranger School

A few words about the new Maritime Forest Ranger School (MFRS) training sawmill. After Frank Petro's talk about sawing hardwood, we can all see the need for proper training and that is what the training mill will be all about. We will be able to train all facets of sawmill employees, such as sawyers, edgermen, millwrights and trimmermen. The mill will be equipped with both band and circular headrigs, edgers with carbide and inserted point saws. The mill will give the sawyer, edgerman or trimmerman a chance to look over their work to see if it is done properly. The mill will have a filing room as well, so saws being repaired by students will be used on the machines in the mill.

As saw maintenance is so important to the way wood is sawn, I will try and indicate a few things you should know about them. The most important thing is that they be properly sharpened and if they become dull, to have them resharpened. Ripsaws are filed or ground square across the front and back of the teeth. Cutoff saws are filed with a face and back bevel.

Most people think that a saw is a flat rounded piece of metal like the cover of an oil drum, this is not true. The metal has to be prestressed in certain areas to a certain degree for certain saw speeds and saw feeds. The body of a circular saw has to have the body of the saw (area between rim and centre arbor hole) prestressed as the rim of the saw expands while turning, if it becomes longer than the body of the saw, the saw fails to cut a straight line and the rim will weave in the cut. If the body has been prestressed too much for the speed, the rim will not expand enough and the saw will run into the log. The mill track must be straight and level and have a solid foundation or the best hammered and filed saws will not cut properly.

The saw arbor must also be level, if it is not, the last cant on the carriage will not be square, also the carriage must be in good condition. The saw arbor must also be aligned so the saw is leading toward the track. The rule-of-thumb of this is 1/8 in. in 20 ft. of track. If the saw heats at the rim--too much lead, if the saw heats at the centre--not enough lead.

Some people think they can compensate for misalignment in the lead by filing a long corner on one side of the teeth, and it will work, to a certain degree, but it does not let one get full potential out of the saw because it will not be cutting straight.

I would also like to add, one must have enough power to keep the saw at the same RPM all the time because if the saw is losing rim speed it will not cut properly. The saw must also have enough set or swage so that the saw plate will have enough clearance in the cut, otherwise the plate may be rubbing the wood on the side of the cut. If this happens, heat generated from the rubbing will cause the saw plate to expand and upset the prestressing of the plate, thus the saw fails to cut properly.

The design of a tooth makes a lot of difference how a saw shears the fiber of the wood a circular rip saw should have at least 30° of hook and at least 12° of back angle and must be filed square on back and face.

Cutoff saws will have a bevel on the teeth, front and back. If the saw is cutting the stock below, the arbor must have negative hook. If cutting stock is above, the arbor may have a bit of positive hook.

A lot of new things are coming up in saws--Stellite hard facing and carbide tips, which retain their cutting edges longer, so not as much sharpening is needed.

They are also working with "laser cut slots" in the saw body instead of prestressing the saw plate. I think it should work well in smaller saws, such as "trimmer and edger saws", but I seem to be a bit skeptical to large "slasher and headrig saws".

All of the above are so important to get the proper target size so that the least amount of cut can be used to finish up the lumber when it comes to the planer. The saving in power is also a plus when you have your saws cutting with sharp teeth and a proper alignment.

I have to go back and impress the importance of the conditions of the sharpness and proper design of teeth to cut certain types of wood whether they be cuts or rip cuts.

Lumber Size Control in the Sawmill

A. St.-Laurent, Forintek Canada Corp.

Our forest resource used to be almost limitless. In the past 20 or 30 years, we have been intensifying its exploitation and today we must realize that it is no longer of top quality and close at hand as it was in the past. In order not to outprice ourselves on the lumber market, we must try to get the most out of each log at the minimum cost. One way to achieve this is to reduce the target size at which lumber is being sawn to a minimum. This is where the Forintek Lumber Size Control Program can help a sawmill.

Minimizing target size can result in more lumber yield out of a log. One board can be longer or even wider in some cases. In larger logs an additional board may be produced. If no extra lumber material is produced, then more chippable fiber will result from the slab and edging material. This is all conducive to better resource utilization, and more profit.

Forintek Lumber Size Program

In order to minimize target size, we must first determine what its components are. First, we have the final product which we will put on the market: it has a minimum dimension, or size, otherwise it will not be the type of lumber we want to sell. For example, a 2 x 4 would have a minimum dry dressed size of 1.500 inch, otherwise it is not a 2 x 4 anymore.

Of course, we cannot saw two inch lumber at a target thickness of 1.500 inch because we must allow for removal of roughness at the planer and shrinkage when it is dried. We must also allow for some sawing inaccuracy, because a saw blade cannot saw wood in a perfectly straight path. These are therefore the three main components of target size (Figure 1).

- Planing allowance;
- Shrinkage allowance;
- Sawing variation allowance.

When the target thickness at which lumber is sawn is greater than what is needed to take these three components into account, we have what we call an oversize.

The determination of the target size by means of its three components as mentioned above is called the "Base Line Study" of the Forintek Lumber Size Program. Once this is done, the minimum target size can be implemented at the machine centre. We recommend, however, that it be implemented in stages, to make sure that other factors do not lead to an undersize. For example, there might be some cupping occurring during the drying process and unacceptable skip may be produced at the planer because of this.

Economic Advantages

As a rule of thumb, a reduction of 1/32 inch in the target size increases wood fiber recovery by about two percent. Of course, in the case of small lumber sizes, e.g., 1 x 4, the increase would be even greater. For every thousand board feet of lumber produced, an additional revenue of up to about $ 5 can be expected if the target thickness is reduced by about 1/32 inch. Recently, a large sawmill has reduced its target thickness by almost 3/32 inch on one line. We calculated that the extra revenue amounted to close to $100,000 over a six month period.

In addition, improvements in sawing accuracy can lead to similar results. In the above mentioned mill, a reduction in sawing inaccuracy was also achieved and accounted for an extra revenue of about $15,000 over the six month period. This was the result of implementation of the recommendations of the Base Line Study of the Forintek Lumber Size Program only.

An objection may be raised to the effect that implementation of a Lumber Size Control Program will cost something. The implementation costs are relatively small because the Base Line Study is generally carried out only once before being in a position to implement it.

The optimum target size is obtained and it can be implemented immediately. We estimate that two persons can carry out a Base Line Study in as little as half a day if the number of samples is small. The cost of maintaining the proper target size over the days and months that follow is almost nil since it involves only a few single measurements per hour. This can usually be done in delay or downtime periods.

The Two Parts of the Forintek Lumber Size Program

The Forintek Lumber Size Program as developed at the western laboratory a few years ago is divided into two parts:

- The Base Line Study;
- The Sawmill and Office Control Program.

The **Base Line Study** is carried out primarily to determine what the target size should be. The **Sawmill and Office Control Program** is then implemented to ensure that the target size remains the correct one over the days and months that follow implementation of the Base Line Study recommendations.

1. The Base Line Study

To carry out a Base Line Study, its three components must be determined: the planing allowance, the shrinkage allowance and the sawing variation allowance.

a. The planing allowance

This value can be obtained from the mill personnel or be determined by a sampling and evaluation technique at the planer. Usually the mill operates

with a fixed planing allowance at the bottom head. For instance, a common value is 1/16 inch.

b. The shrinkage allowance

This value is determined by applying percent tangential shrinkage values to the final dry moisture content of the lumber taking into account the species of the wood.

c. The sawing variation allowance

This is the most time consuming part of the Base Line Study. Measurements must be made on the lumber. The actual size of the lumber being produced is measured at six locations for each board. Three measurements are taken on each edge of each piece of lumber. The three measurements are spread out along its length in a random manner. In the case of a lumber width where the thickness is four inches or less, only three measurements are taken, along one edge only (Figure 2).

Two sheets are provided to record the data: the "General Information" sheet and the "Lumber Size Measurements" sheet. Data pertaining to the machine centre being studied, wood species and planer and shrinkage analysis, as well as the type of results desired, are entered on the General Information sheet.

Data originating from the Lumber Size Measurements are recorded on the second sheet. Filling in the Lumber Size Measurements sheet requires that the measurements be taken in the proper order on each board so that the computer can give accurate data about bevel and longitudinal shape of the lumber.

The lumber bevel and longitudinal shape analysis will indicate areas of possible improvement in the machine centre tool (e.g., saw) or feed system. Also, as with all data to be entered in a computer, the instructions must be followed to the letter because the computer will do exactly what it is asked to do . For this purpose, an instruction book is provided for those wishing to implement the program.

It is strongly suggested to use calipers to take the measurements. However, the program accepts data from tape measurements to the nearest 1/32 inch. Calipers with dial readouts instead of verniers are readily available, and new digital readout calipers that increase accuracy and speed of the readings are starting to make their appearance.

Forintek is presently developing such a caliper system that feeds the data to a portable recorder. In this manner, only one person is needed to measure the lumber since the readings are automatically recorded at the push of a button, located on the caliper, into the portable recorder.

Now that the number of measurements to be taken on each board, and their position on the board, is known (Figure 2), we must determine how many boards are to be measured. The number of boards to be measured (sample size) depends on the sawing variation. It can vary from a minimum of 50 boards if the sawing variation is very small, to 250 if it is very large. When six

measurements per board are taken, this means that a total of 600 measurements will be taken if 50 boards are sampled and correspondingly more if more boards are sampled.

To determine sample size for the first Base Line Study, a very simple method is used. Ten boards are chosen and one reading on each is taken. The difference between the largest and smallest reading is obtained and divided by four. A table is provided in the Lumber Size Program Instruction Book and from it the number of samples can be obtained with the value calculated above.

When one Base Line Study has been carried out and that a second is being planned, data from the results of the first study are used to determine the number of boards to be sampled. This usually gives a smaller sample size than the method described above.

When the two data sheets are filled in, they can be sent to Forintek where they will be processed. A computer printout will then be sent to the sawmill indicating the recommended target size, the sawing variation and data pertaining to the second part of the Lumber Size Program: the Sawmill and Office Control Program.

This control program will allow the sawmill to follow the behavior of the machine centre analyzed in the Base Line Study over the days and months that follow. This will serve to make sure that the target size and sawing variation remain within acceptable limits.

2. The Sawmill and Office Control Program

After the results of a Base Line Study have been implemented at a machine centre at a sawmill, it is advisable to keep track of its performance so that the settings always remain optimum over the days and months that follow. For this purpose, the Forintek Lumber Size Program contains two monitoring programs.

The first one, called the Sawmill Control Program, keeps track of the daily performance (or performance during one shift) and the second, called the Office Control Program, covers a much longer period (about one month, and can continue as long as required). Both of these programs are carried out by plotting lumber size measurements on charts built up from data supplied by the Base Line Study.

a. The Sawmill Control Charts

Sawmill Control Charts are prepared from data supplied by the Base Line Study. On the vertical axis of the charts is the lumber size and on the horizontal axis, the number of observations. Horizontal lines are also drawn, which correspond to the target size and to an upper and lower limit (Figure 3).

Between 8 and 40 single measurements, one per board, are taken over the shift period (e.g., eight hours). The number of measurements depends on the sawing

accuracy, and is given by the results of the Base Line Study. It can be seen that this does hardly take any time since the measurements can be taken by an operator provided with calipers. This can be done when a delay occurs when no wood goes through the machine for 10 or 20 seconds or more, for example. The data is plotted on the charts simply by darkening a square or putting an x or check in it.

A difference can be made if the operating conditions change (e.g., sharp saws) or if a change of operator occurs by plotting an o instead of an x, for example. Daily control is maintained by observing the percentage of x's or o's that are above or below the limits drawn on the chart. In addition, the chart is provided with an area to note observations pertinent to machine centre operation.

b. The Office Control Charts

Between 8 and 40 observations of lumber size per shift were collected for the Sawmill Control Charts. To plot data on the Office Control Charts, the average of these 8 to 40 observations is calculated for the Lumber Size Chart, and the standard deviation of these observations is calculated for the Sawing Deviation Chart.

Again, the vertical axis of the charts is the lumber size for the Lumber Size Control Charts. Also, limits (horizontal lines) are drawn, but these limits are more restrictive than those of the Sawmill Control Charts. This is because the Office Control Charts are used over a period of several weeks and that the data are plotted from average values. Warning limits are also drawn on the charts in this case. This allows for a better and tighter control of the lumber size. These data to make out the chart are also all provided by the Base Line Study.

In the case of the Sawing Deviation Control Chart, the vertical axis is sawing deviation values provided by the Base Line Study. In this case, it is the standard deviation that is plotted on the charts. This allows the sawmill to monitor the sawing deviation of the machine centre and to determine when a problem occurs if the sawing deviation goes beyond the limits.

Also, if the deviation can be reduced, the chart will indicate when a reduction in target size can be contemplated. Then a new Base Line Study can be carried out to determine the new target size.

More information can be obtained about the Forintek Lumber Size Control Program from Forintek Canada Corp., 800 Montreal Road, Ottawa, Ontario K1G 3Z5. Technical assistance can also be provided by Forintek and various options for this are available. Some of these are available free of charge to some extent for all Forintek members.

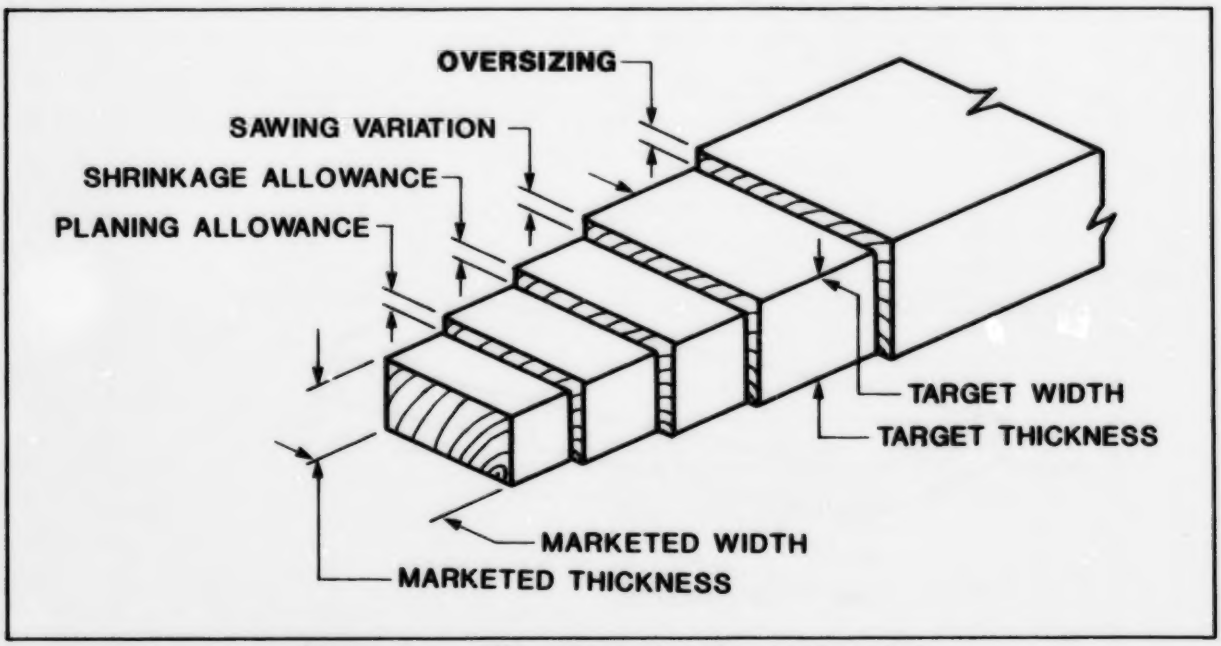


Figure 1. The components of a target size

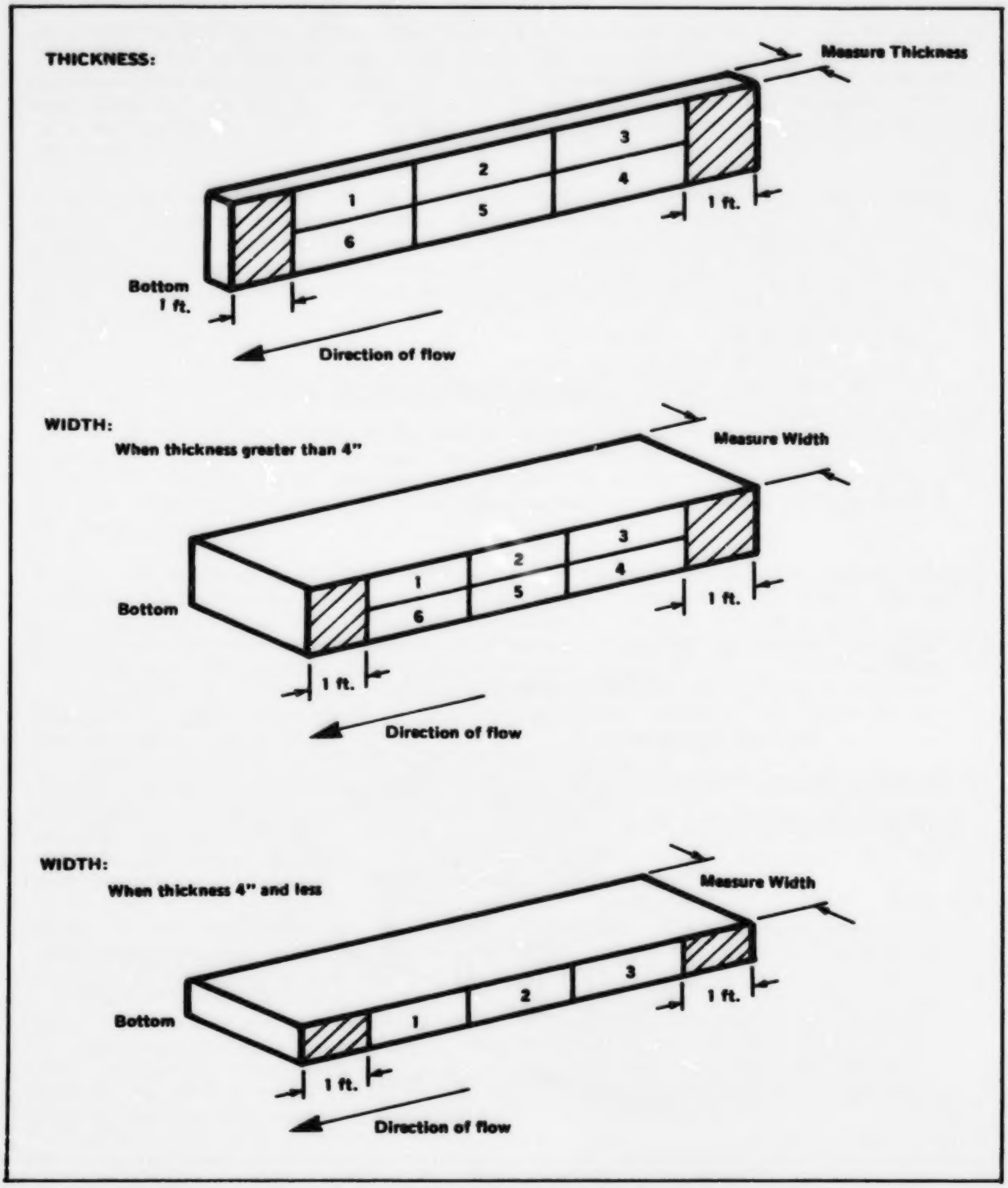


Figure 2. Correct measurement locations

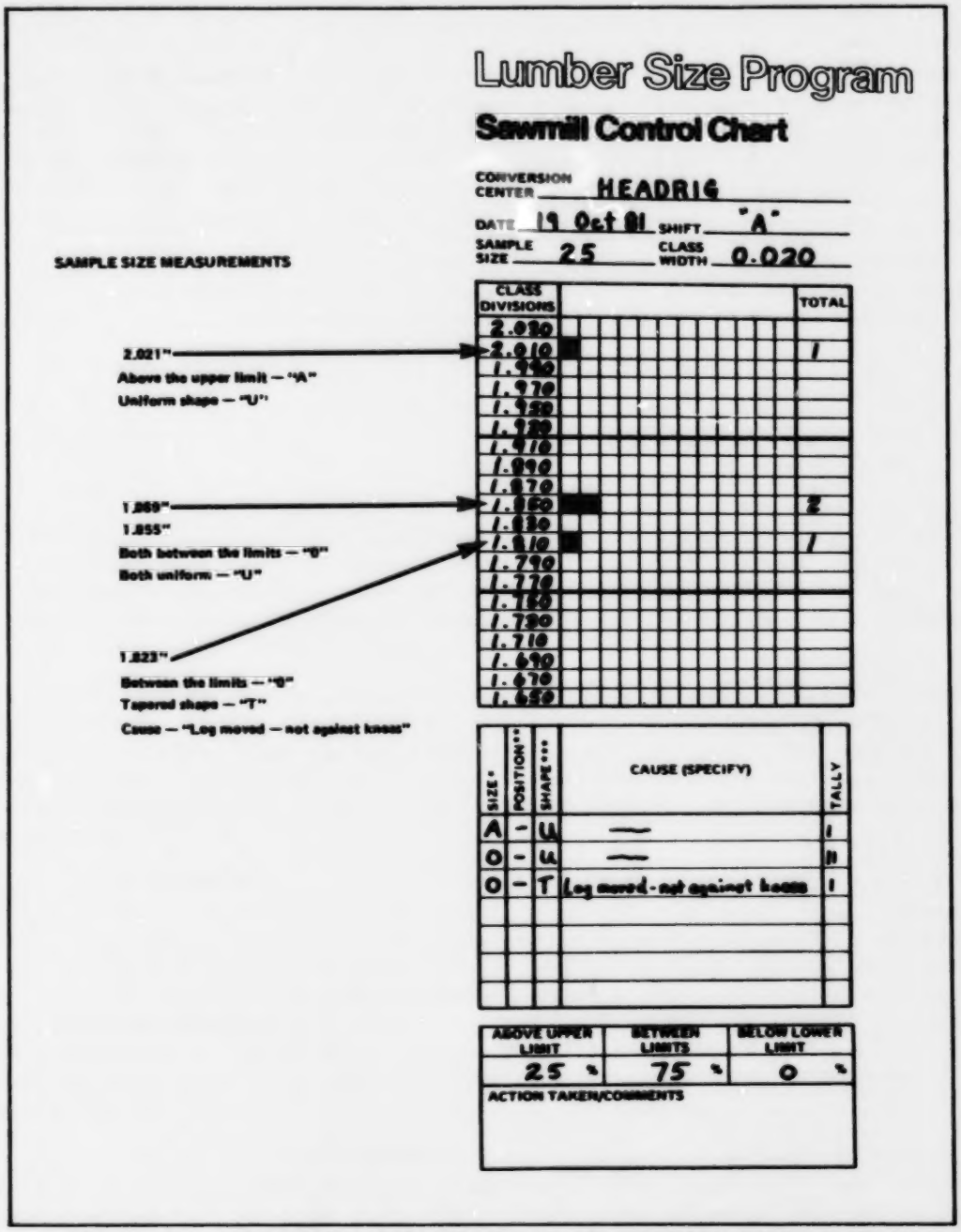
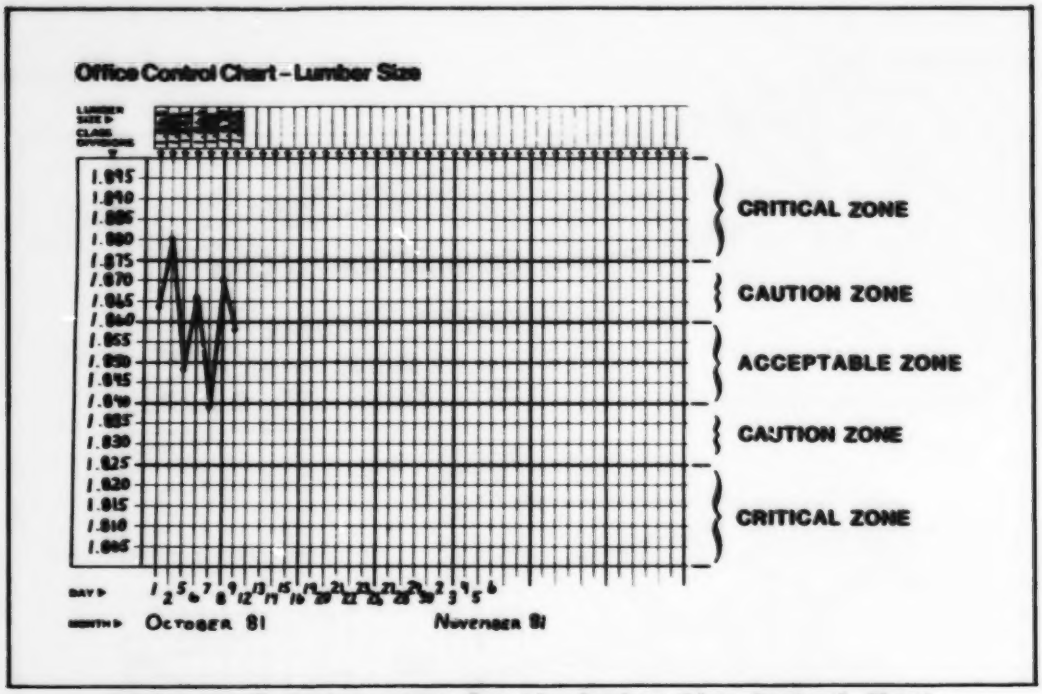
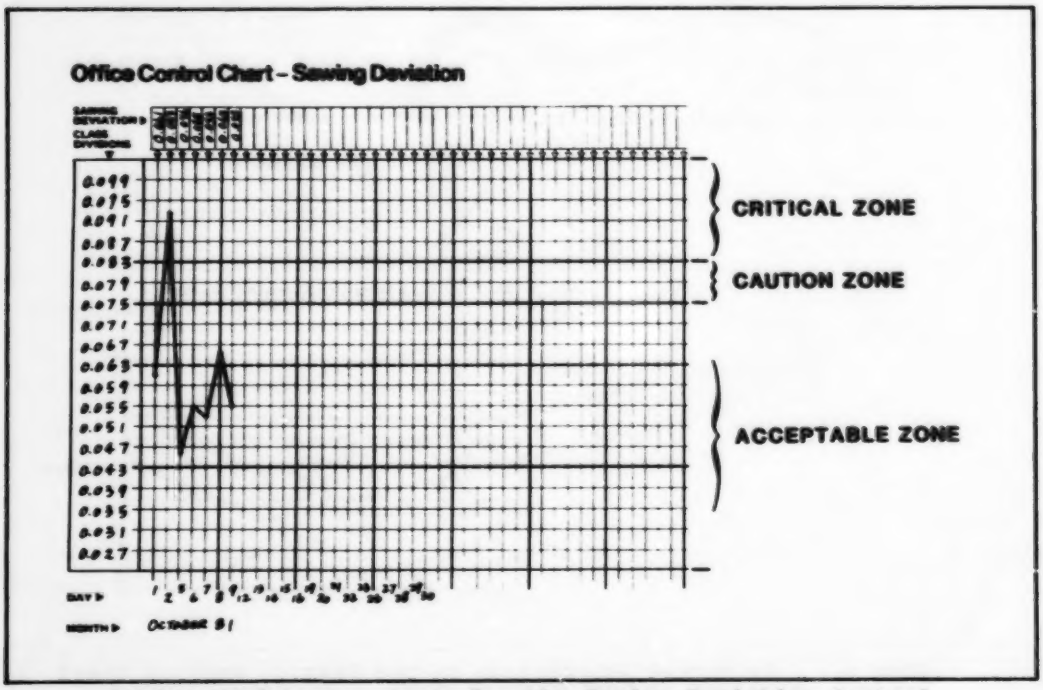


Figure 3. Recording information on the Sawmill Control Chart



Sawing performance zones for the Lumber Size Control Chart



Sawing performance zones for the Sawing Deviation Control Chart

Update on Saw Technology

A. St.-Laurent, Forintek Canada Corp.

From time to time we hear of new methods of fabricating lumber from logs. One striking example of this is the reference often made to cutting wood with laser beams. Cutting of wood with high pressure water jets is also mentioned. And there is the kerfless cutting of wood with a knife, something like peeling thick veneer into lumber.

Research is being carried out on these methods and on several others, but most of them are still well away from commercial application. Other developments, such as Stellite tipping and the Detenso circular saw, are just about ready for commercial application in eastern Canada and are being implemented in the west.

Stellite Tipping

Stellite tipping of saw blades originated a few dozen years ago to saw abrasive tropical wood species. In some cases, it was not possible to complete a saw cut without the standard saw tips becoming dull and the sawing accuracy consequently deteriorating badly. Forintek's western laboratory first started to apply this technique in the sawing of western red cedar in the green (unseasoned) condition. The standard saw tooth tips were becoming dull much more rapidly than in other species in that case.

Sawing of these other species in the green condition with Stellite tipped blades was then studied, and sharpening intervals could also be reduced in these cases. In the case of dry (seasoned) wood, the reduction was not as important. In this case it is only the abrasion of the tip material that is reduced, whereas in wood in the green condition, abrasion and corrosion are both involved.

In the case of sawing green materials, wear resistance can be extended up to 12 times by Stellite tipping, compared to standard saw steel tips. Because the tips stay sharp longer, several advantages show up compared to standard saw steel tips. A sharp saw steel tipped saw blade cuts just as well as a sharp Stellite tipped saw blade. However, since a Stellite tipped saw blade stays sharp much longer, its sawing accuracy will not deteriorate as fast. Since this means probably more lumber recovery because it will allow a reduction in target size, this advantage over standard saw steel tips is probably the most important.

If lumber recovery is not increased, chip recovery will be. A second advantage is that the sawn surface roughness of the lumber will not increase as fast because the saw tips stay sharp longer than standard saw steel tips do. It has been estimated that sawing accuracy and sawn surface roughness have both deteriorated by about 0.020 inch each when a saw needs resharpening.

Other advantages can be obtained by using Stellite tips on saw blades. For instance, when compared with standard teeth, saw blade costs will be reduced

because the Stellite tipped blades require less sharpening. Less time will also be needed for sharpening these blades. Since the tips stay sharper for longer periods, approximately 15 percent less power is required with Stellite tips than with standard tips.

Other advantages are claimed, such as possible increases in feed speed of 10 percent, increases in production of 25 percent and reduction in saw kerfs of 0.025 inch. At the beginning of 1984, it is reported that 12 Canadian and seven U.S. west coast mills use Stellite tips on circular or band saw blades, or on both.

When Stellite tipping was carried out in the past to saw abrasive tropical woods, the Stellite was applied with a rod and acetylene torch to the tips. This method was used up to a few years ago to implement its use, but since then rapid development of semiautomatic and automatic machines has occurred.

The Original Vollmer and Iseli are two semiautomatic Stellite tipping machines. The Original Vollmer machine preshapes the Stellite deposit to the basic saw tip geometry. Considerable skill is required from the operator to temper the tip after Stellite deposition. Methods differ for the circular saw tipping and thin kerf band saw tipping with this machine.

The Iseli is a Swiss semiautomatic Stellite tipping machine that applies the deposit by resistance welding. A Stellite welding rod is fed parallel to the tip edge and cut by small disc after welding to the required side clearance.

Stellite application may also be done by brazing. Casted or powder metallurgy tips are attached by silver solder. Existing equipment used for grinding carbide-tipped circular saws may also be used for Stellite-tipped saws but a side grinder may also be required.

Automatic Stellite tipping machines are simpler to operate than semiautomatic ones but are more sophisticated and may be more difficult to maintain. Original Vollmer has two such machines: one of these uses Stellite pellets produced from Stellite welding rods and welded by TIG (tungsten inert gas) welding. This method is particularly well suited when a variety of saw blades are to be tipped.

A third machine, the French Alligator machine, also uses TIG welding and Stellite wire and is very similar to the second Vollmer automatic machine mentioned above but uses more Stellite per tip and more grinding is required.

The Detenso Circular Saw

The Detenso circular saw blade is a blade that does not require tensioning. It contains very narrow slots that penetrate its plate from side to side. These slots eliminate the stress build-up that causes an untensioned circular saw blade periphery to deform laterally. In that case the saw is said to "snake" and therefore cut much less accurately.

The Detenso circular saw blades have been used in edger applications recently and have been found to perform as well as regularly tensioned blades over a period of three weeks. Accuracy of the lumber sawn by these blades was

measured and no noticeable deterioration was observed as compared to lumber sawn by conventionally tensioned circular saws. This means that the tensioning operation can be eliminated for these blades, therefore saving maintenance time for the blades. The blades will only require levelling in addition to other maintenance operations such as sharpening of the tips.

The Detenso circular saws are presently being manufactured by Hannaco, a U.S. company owned by International Knife and Saw. It uses laser cutting techniques just recently available to cut the narrow slots and give it a "fish hook" configuration. Although its concept had been studied as far back as 1959, the new laser cutting method made it technologically practical. This is why this blade is often called a "laser tensioned" blade, although strictly speaking, it is not tensioned.

The blade manufacturer claims that the Detenso blade also increases lumber recovery compared to conventional blades. This may be the case because of a shift in the vibration frequency ranges to higher ranges. This should mean a reduction in vibration amplitude and consequently in sawing variation. Any reduction in sawing variation will allow a corresponding reduction in target size, as the lumber size program demonstrates, and this leads to an increase in fibre recovery.

The "Hi-Earn" Saw

The "Hi-Earn" circular saw has saw teeth that are unevenly spaced along its rim. This prevents the blade from vibrating at a harmonic frequency generated by the regular pounding action of the tips when the tips are spaced equally. There is evidence that indicates that the saw actually does eliminate harmonic vibrations and that it operates at three to four decibels lower than conventional saws.

The Hi-Earn saws operate as well as conventional saws but more monitoring has to be done in the area of sawing variation. If reduction or elimination of harmonic vibrations lead to a reduction in sawing variation, an improvement in fibre recovery through target size reduction will result.

The "Smart Saw"

The "Smart Saw" consists of a device that monitors the temperature of the rim and centre of a circular saw and eliminates the heat gradient in the saw plate by heating the cooler part by induction. Sensors will be included in the saw guides and will allow display of various parameters such as vibration amplitude, blade position within the saw guides, guide temperature, etc. The prototype has been tested at MacMillan Bloedel's White Pine mill in Vancouver. Future developments will involve application to band saws.

The Thermo-Stress Unit

The Thermo-Stress unit and the Smart Saw are both designed to eliminate the heat gradient in circular saw blades. Unlike Stellite tipping and the Detenso saw, they require additional peripherals such as induction heaters, sensors

and controllers, so that they will operate satisfactorily. While the Smart Saw uses a displacement probe to monitor saw deviation, the Thermo-Stress unit uses infrared cameras which require phosphated saw blades. Approximately 40 Thermo-Stress units are now in use in Europe.

Computerized Saw Design and Operation

Computers can not only be used to optimize cutting patterns, thereby maximizing product value and recovery, but also to optimize saw design, operation and maintenance. Computer programs are available to determine what are the optimum sawing parameters for a given condition. For example, these programs will determine what is the optimum feed speed for a given depth of cut, saw speed, etc. They can also determine optimum saw plate thickness, number of teeth for maximum gullet capacity and even such factors as cutting accuracy. An operator will thus be able to know what sawing accuracy he can expect under a set of sawing conditions.

Reduction of sawing inaccuracies through elimination of heat gradients in saw plates by various means may allow reduction of saw tip side clearance. Side clearance may then approach only what is required for wood springback after cutting it. This would still further reduce losses from saw kerf widths.

Machine Improvements

In addition to improvements to the tools themselves, such as by Stellite tipping, saw tooth spacing and stress relieving, the machines on which the tools are mounted are also being improved or redesigned. For instance, tensioning of some band saws is provided through specially grooved bandsaw wheel faces having an appropriate wheel crown.

Another development, called the "Rimsaw", overcomes the temperature differential problem across the plate of circular saws by separating the rim from the centre part. It consists of a ring-shaped blade that runs on a hydrostatic bearing mounted on the centre part of the blade. The ring is rotated by means of linear induction motors and guided above and below the cut and at other points along its periphery. Elimination of the heat gradient generated in circular saw plates by the cutting action of the teeth will improve sawing accuracy or allow for narrower saw kerfs, or both.

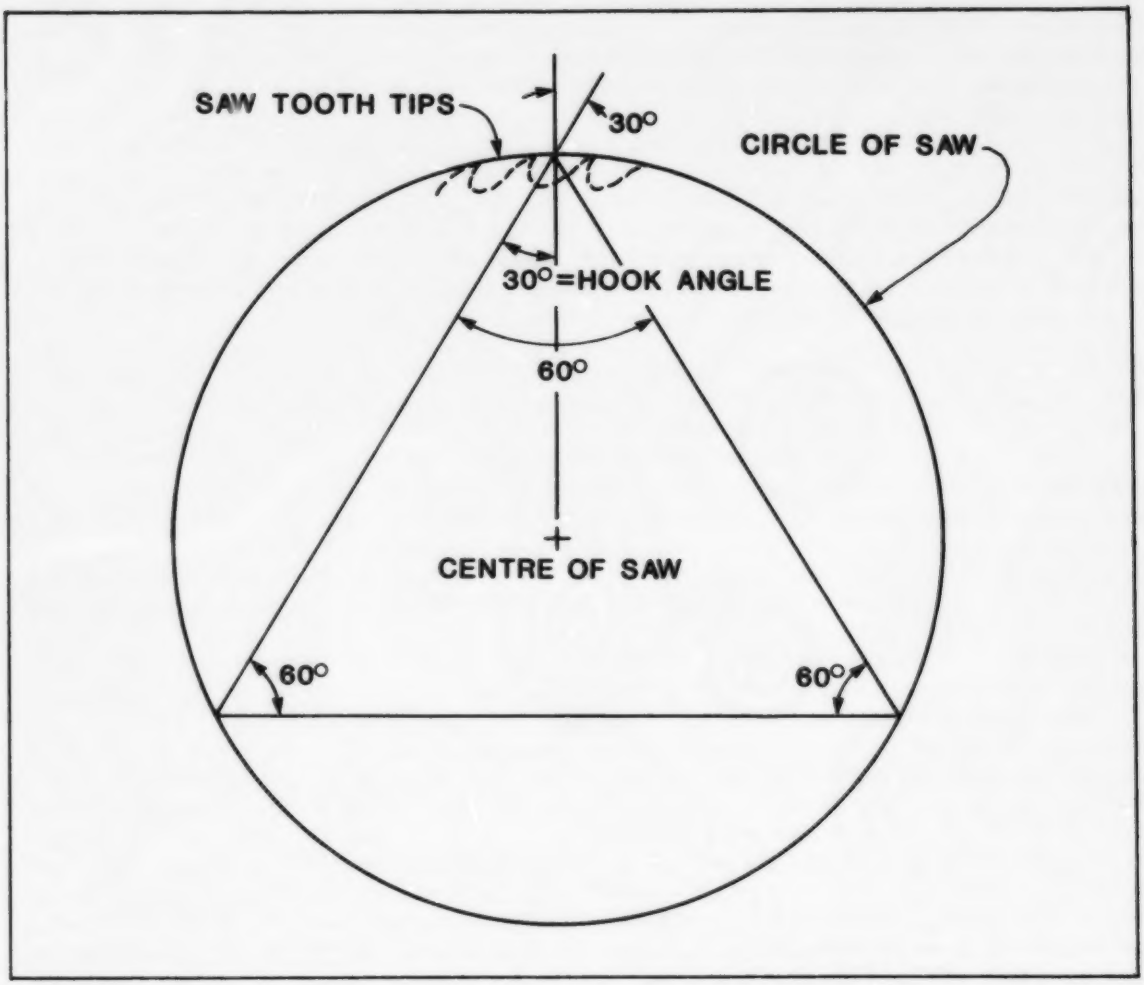
Other developments in wood cutting machines are often more radical. For example, a lumber slicer prototype has been tested under sawmill operating conditions. At the moment, it only fabricates two 2 x 4s from 4 x 4 cants, but operates at speeds of over 300 feet per minute and does not produce sawdust. It is also almost noiseless and is claimed to require less maintenance than comparable saws.

References

Piercy, C.W. and L.K. Campbell. 1983. Lumber Size Program. Users' Manual. Forintek Canada Corp., Western Laboratory, Vancouver, B.C.

Stephenson, E. 1983 and 1984. Cutting tools for woodworking. A series of articles in Furniture Production Magazine.

Westergaard, B. 1982, 83 and 84. The evolving sawmill. A series of articles in Logging and Sawmilling Journal.



Sawmilling - Today and Tomorrow

M.J. Brisson, Forano Ltd.

When I was invited to this seminar, the idea was that I should talk about sawmilling and how to get the best out of it. That I intend to do, but first let's take a short trip to where lumber making starts--in the bush. There we find trees, the way nature made them, but not always in the best shape to produce sawlogs. They are mostly small, many are crooked, the bigger ones have a lot of taper and branches, and some are diseased. They are that way because nobody bothered to cultivate the forest, let alone try to grow one from selected seed and nursery conditioned plants.

When the end of profitable sawmilling comes to Canada, it won't be for lack of equipment, technology or trees--it will be because most of the timber will be too far away, the trees too small and too thinly spread to be harvested. Because results are so long coming in our cold climate, we should have been the first to restock our timber reserves where we really need them; instead, we're in the last ranks, far behind countries which are newcomers, compared to us, in the forest products market.

Coming back to sawmilling here and now, let's see how we can make the best of what we have to work with. Trees in most eastern softwood limits average around 4.5 cubic feet of commercially usable wood fiber. If you cut a tree, the first rule is to get all of it that's usable, to the mill. Any foot high stump left on the forest floor, not only is a hazard to rolling equipment, but represents a loss of as much as eight percent of the total volume of the stem.

After comes delimbing, and over the years the lack of care in this operation has probably caused more snags, stalls and breakdowns in sawmill equipment than anything else you can name. Fortunately, the increasing use of felling and delimbing machines has cut down on the height of both tree stumps and limb stubs. Investing in this type of equipment is well advised even if it means, in these hard times, an extra call on the banker.

The next operation down the production line is slashing (or bucking) to log length, either in the bush or at the mill. If you're running an eight foot stud operation, you are losing one percent of your rough log volume for every extra inch of log overlength which is not strictly necessary to produce marketable lumber. Even in stud production, there is a market for under 96 in. lengths, so it's worth checking what is the minimum log length you can get by with, and to make sure your slashing process, whatever it is, will produce it.

In random length mills, the volume loss per inch of log overlength is about two thirds of one percent, which is still enough to call anybody's attention. By the way, I have never seen anyone checking log lengths coming into the mill; I hope it's done somewhere up the line. Anyhow, the second trimsaw man knows the story, but by that time it's too late.

While we're still in the yard, let's take a look at the wood handling. Truck unloading and recovery from log piles with fork type loaders can account for

up to one percent lumber loss due to wood damage. The grapple type carrier seldom breaks logs as it works from the top layer, rather than bucking the bottom of the pile the way a forked carrier has to. Tire wear and drive train failures are also reduced.

Next, let's look at the log storage plan. Because some mills produce best with a certain mix in log sizes, stockpiling should make some control of it possible. This isn't a question of sorting; it simply means sending each truckload to some particular piling area, depending on average log size of the load.

Now we're at the "nuts and bolts" stage--the lumber making. Before we rush into the mechanics of it, let's ask one basic question: what are the worst plagues in mill production? One of them sometimes is our own selves, but here are some others: the "no log" situation, miscutting for any reason and equipment plug up or breakdown.

It is accepted that an eight hour shift, including scheduled breaks, should have a minimum of 400 minutes of productive time. This doesn't include time spent cutting in two logs that got stuck in the debarker, unplugging the chipper or even, at worst, trying to keep the mill from burning down. Talking strictly of productive time, how close do you come to the mark? If you don't know, it's already bad. So next, how closely are you checking? If you are, then you already know what the main causes of downtime are in your mill. It's usually a matter of equipment and people; both problems have to be recognized and treated.

To look at these problems, let's use a typical mill layout such as shown on Plan "A". This has a tree length slasher, ring type debarker, log twin saws, slab resaw, bull edger combined with board edging, and chip making equipment. It can produce about 12 million board feet, by single shift, from logs averaging around 18 board feet of sawn lumber.

"No logs" at the headrig has to come from some hold up in the yard or at the debarker. Whether you stock tree length or sawlogs, any terrain improvement will pay for itself in more regular log feed and less maintenance cost for any carrier in the yard. If you have only one debarker, a tool change during the shift costs production. Did you try carbide tipped tools, or replaceable inserts, at least for winter debarking?

To keep from starving the headrig any time log production is held up, the mill should have reasonable storage in front of both the debarker and the saw. For this type of mill, with an average log feed of six per minute through the twin saws, 30 ft. decks would give close to 10 minutes of production for each machine, which is about right. The debarker should also be able to play a "catch up" game after any delay in the rough log supply. A fast machine, preferably with six debarking tools, along with sufficient deck storage, is your best insurance of keeping the production line supplied.

As we go down this line, the "everybody" factor becomes very important. In a small log mill, a 60 in. twin band headrig should put a log through on an average of 10 seconds, including log loading and placing, and setting the saws. If, for some reason, the whole operation takes 11 seconds, when sawing your average sized logs, it means a 10 percent production loss which could be avoided.

Good sawmilling, like good hockey or baseball, needs teamwork to make every detail as correct as possible--it takes everybody in the mill to do it. The headrig is a good example of how many people have to do the right things if you're to get the best from it. Every log has to be properly placed, the feed table lined up with the saws (how many times did you check this last month?) the saw guides have to be adjusted at least daily, the blades tensioned accurately, the teeth correctly ground, swaged and side dressed, and the blade strain adjusted to a practical maximum.

If you're willing to make a small investment to get rid of one of the most common equipment problems in the headrig or any band saw, which is pressure guide misalignment, I recommend you install rotary guides which do not need any adjustment for many months at the time.

In the "you and others" factor, the operator plays the biggest part. He spends his day in front of the machine and, even if he can't correct whatever may be wrong, he should have some idea as to what it is. He should feel free to talk to the production boss, the filer, the maintenance man, and discuss any problem openly.

If you feel this is not happening, try to get the communication lines unplugged. Apart from this, operator's fatigue has a very negative effect and midshift rotation could improve that; it could also help you find the best man for every job and sometimes limit the damage when any one of your keymen is missing without notice.

We now come to the slab resaw. In the low volume mill, maximum lumber recovery is the order of the day, and the resaw is the hardest working machine in the whole system. Because of the large number of slabs produced by the twin saws and the bull edger, a horizontal band resaw is often used in this type of mill.

With the long cutting span, pressure guides close to the feed bed are a must, for maximum blade support as it goes in and out of the slab taper. In this machine, sawdust and residues tend to float into the guide downstream of the blade travel and cause heating, specially if you are still using open type guides. The tail man near the machine should keep this guide free; if not a thousand board feet or two of wavy lumber may go down the green chain before anybody catches on that anything is wrong.

While slabs are being sawn into boards at the resaw, the cant from the twin band carries on to the "bull" edger. This machine nowadays has thin kerf, carbide tipped saws, powered press rolls, and a saw arbor mounted above the cut. Bull edgers up to six inch cutting capacity, use "strobe" type saws that do not need guides nor water cooling. Feed is up to 350 F.P.M. in four inch cants and 250 F.P.M. in six inch cuts. Saw kerf, under these conditions, is about 0.190 in., or 3/16 in., year round. Top arbor machines are also used (for eight inch cuts or more) but using guided and water cooled saws. The kerf can be about 10 percent more, but the feed rate is lower and horsepower per saw is from 60 upwards.

If you are still sawing cants with thick inserted tooth saws, and a kerf of almost 3/8 in., the extra sawdust represents a lumber loss of about 10 percent for two inch nominal lumber, and twice that much on one inch boards. Since

the bull edger saws out more than two thirds of the production in the type of mill we are looking at, you can count on an eight percent overall lumber loss by using traditional rather than thin kerf saws. Whatever kind of edger you are using for resawing cants or edging boards, you can easily lose another two to three percent in lumber footage by miscutting, specially when the piece is crooked or has a lot of flash wood or taper. It goes without saying that either light or shadow guide lines should always be used to help lining up the piece before cutting.

Since the twin band faces the crooked logs parallel to the sweep, all boards and cants carry the full curved shape of the log. No amount of placing in front of the edger will get you all the lumber there is in a crooked 16 ft. piece, unless you cut it in two first. The simplest solution to the problem is to reslash the crooked cants on the transfer to the "bull" edger. (See the cant slasher in Plans "A" and "B"). If you have a lot of balsam, you may also want to do some selective trimming to get rid of heavy rot which may break up and jam the saws.

If you don't have this problem, the twin band operator can kick the crooked cants to the off-side from the edger and make the eight foot cut from his normal position. In terms of lumber recovery, the bull edger is the most critical piece of equipment; it makes the most cuts and is the closest machine to the chipper, where many mistakes disappear.

I haven't said anything yet about setworks. If you figure that the setting on your twin saws and resaw may give you variations of plus or minus 1/16 in., you are probably adjusting for about 3/32 in. overdimension, so as to avoid "hit and miss" when dressing. This affects the width of lumber produced from cants, the thickness of all usable slabs from the twin saws and lumber dimension from the resaw. The combination represents an extra volume of shavings calculated at 40 green tons per million board feet, of dressed lumber. This takes into account that the majority of the two inch lumber is cut by the bull edger, where thickness is exact.

Even so, the loss in lumber and chip value due to faulty setworks can be in the area of $ 2,300 per million board feet production in the mill. That should be enough to justify replacing any unreliable setworks in the mill. The best systems nowadays are hydraulic with electrical controls, and come in two classes: the stacked cylinder type, which is now made very compact inside a single cylinder barrel, and allows adjustment of any set in steps of 1/32 in.; then there is the single cylinder setworks with linear transducer, electronically controlled, with stepless adjustment, for mills supplying both the local and overseas markets. Either type is very reliable and far superior to the older models using electric brake-motors or cam boxes and limit switches.

Inside the mill, lumber trimming is the last operation affecting lumber quality and recovery. First, the man in front of the trimmer should know something about lumber grading and market value; he should have the choice of returning any piece to the edger or the resaw. A few points in grade and volume may be lost if the remanufacturing of any piece is misjudged. On the other hand, producing odd lengths and widths will increase your recovery and profits, as long as those dimensions aren't left in the yard, or in time sent to the chipper.

Where log supply is limited, the main concern has to be maximum lumber recovery, which means a tight owner-run administration and good teamwork on the sawfloor. In these tough market years, it's up to the production and maintenance people to spot the money losing areas, check them closely and take any action they can, including recommendations to the owner. Success in lumber making has always been a matter of team efforts, even more so in private enterprises without large company backing.

In sawmilling, every bit counts, and not the least of it is good marketing. Selling lumber profitably is as important as making it--for the independent producer, selling boards, short lengths, odd widths, in fact keeping the lumber inventory as low as possible, is a necessity to make a profit in good years and to survive through bad ones. Even as a local operation, don't be afraid to look outside of your local or traditional markets. Get yourself good communications, including telex, to reach any outside market area. Don't be afraid to move out, make personal calls on your main jobbers, look into the overseas market. It's a big world, and there may be something in it for you if you look hard enough.

One thing needed for successful marketing away from home is product quality. This is an everyday thing and it is based on teamwork just like production. Besides, it needs somebody responsible to check at any time of day if dimensions, grade and finish are kept within acceptable limits. No complicated equipment is necessary; just a measuring tape, two or three thickness gauges, a well planned record sheet and lots of observations. If anything amiss is spotted, the reason has to be found and action taken, even if the cause is only temporary. If you finish up every shift with a dull blade on the resaw, you will produce a lot of wavy lumber during the year and this will kill your chances on the rough lumber overseas market.

The same spirit of quality control must be applied to the condition of your equipment. Again here the whole team is involved, first to spot anything which might cause trouble; mostly it's small things in the handling equipment such as tightening up set screws, chains and belts, keeping everything lubricated and properly lined up. Downtime in a mill mostly comes from details which could have been corrected long before any problem happens.

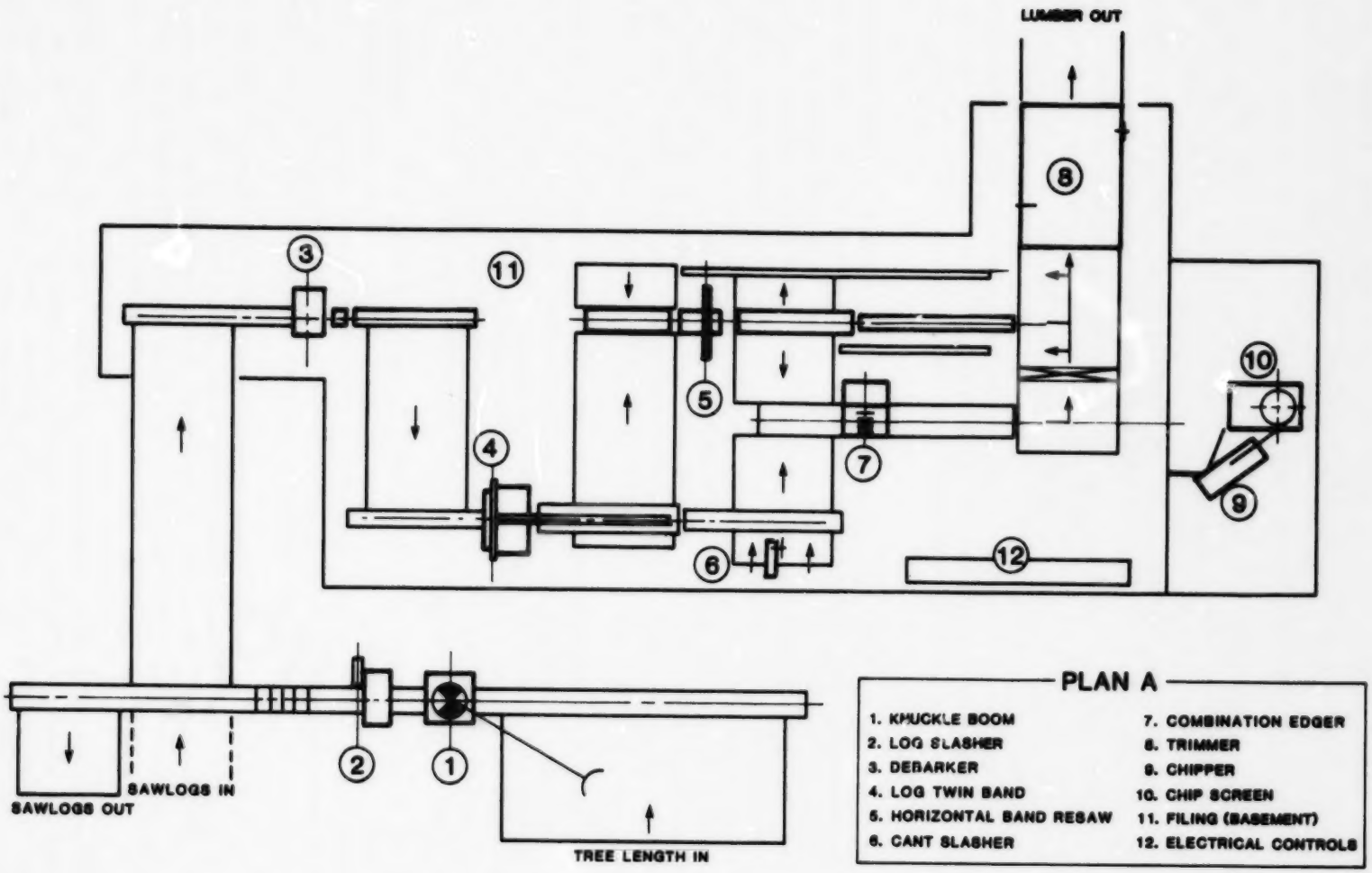
Before closing, let's take a quick look at the future which we hope to be a little better than right now, at least as far as the lumber market. When that happens, you'll want to increase your production and your first bottlenecks will be in resawing and edging. A board edger can be added, and even a second debarker, without disturbing the original equipment layout.

As far as the shortage in resawing capacity goes, I suggest adding a chipper canter in front of the twin band. This would keep the manpower situation even inside the mill, by reducing piece handling at the resaw. The expanded mill would then look something like plan "B". Production could increase by 50 percent, with good load balance all through the line.

The larger the mill of today, and more so tomorrow, the greater the need to have extra capacity for the smaller logs--in other words, it needs a small log production line which is fast feeding and automatically controlled. The closest we come to this at the moment is in the chipper canter, bull edger line, fed from diameter sorted logs through electronic scanning and controls.

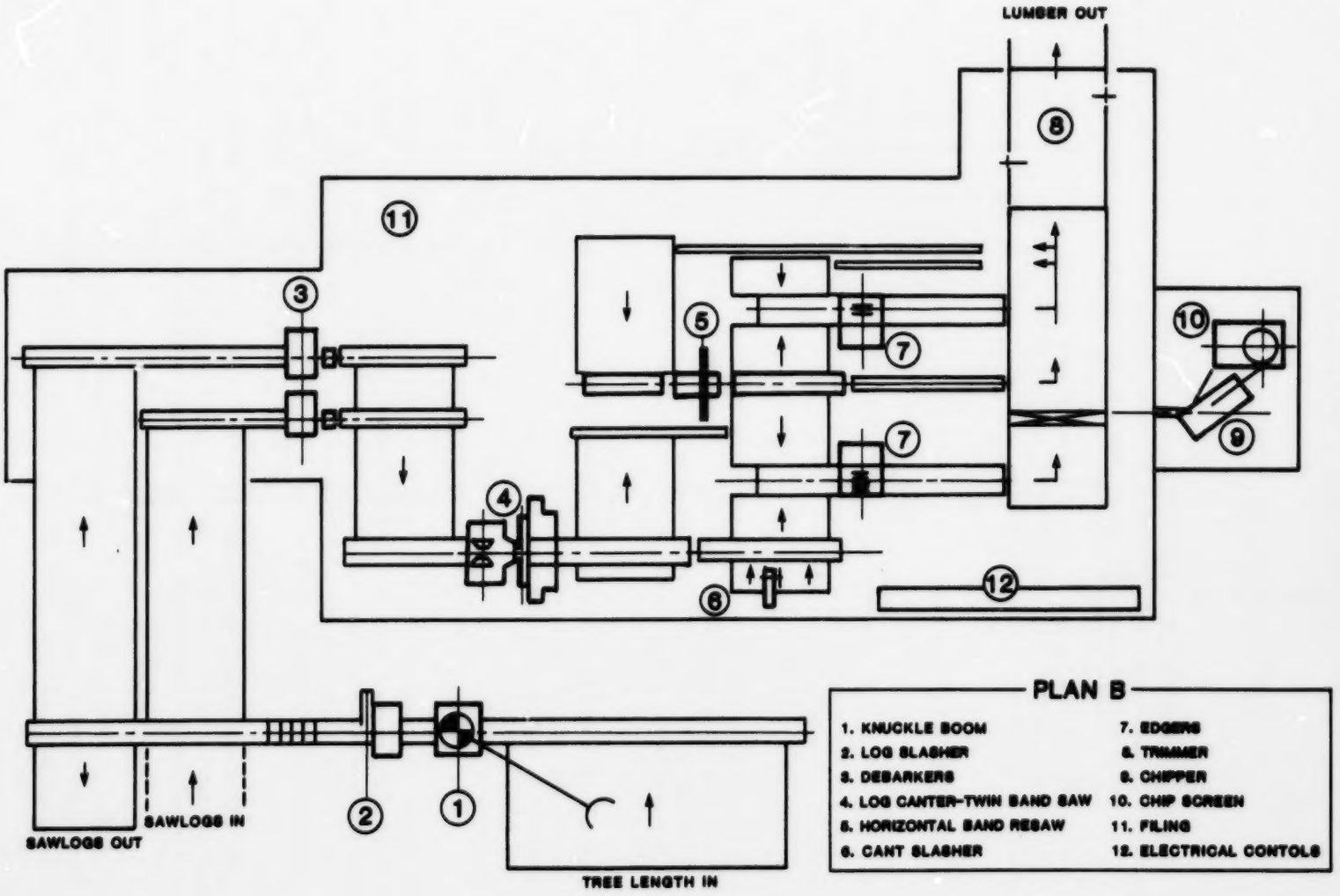
This system, shown on Plan "C", is meant to handle the lowest diameter class in a two-line mill. A number of those are presently functionable with spectacular results, such as 35 log per minute through put in eight foot length, and more of them are in the planning stage.

Problems in the larger mill are basically the same, except that there are more of them; also, the more pieces going by, the more chances there are to waste lumber, so you become even more dependent on everyone in the crew keeping both eyes open, even on rainy Mondays. In the sawmill game, like in any other, it is the team effort that does it--you can't get anywhere without it.



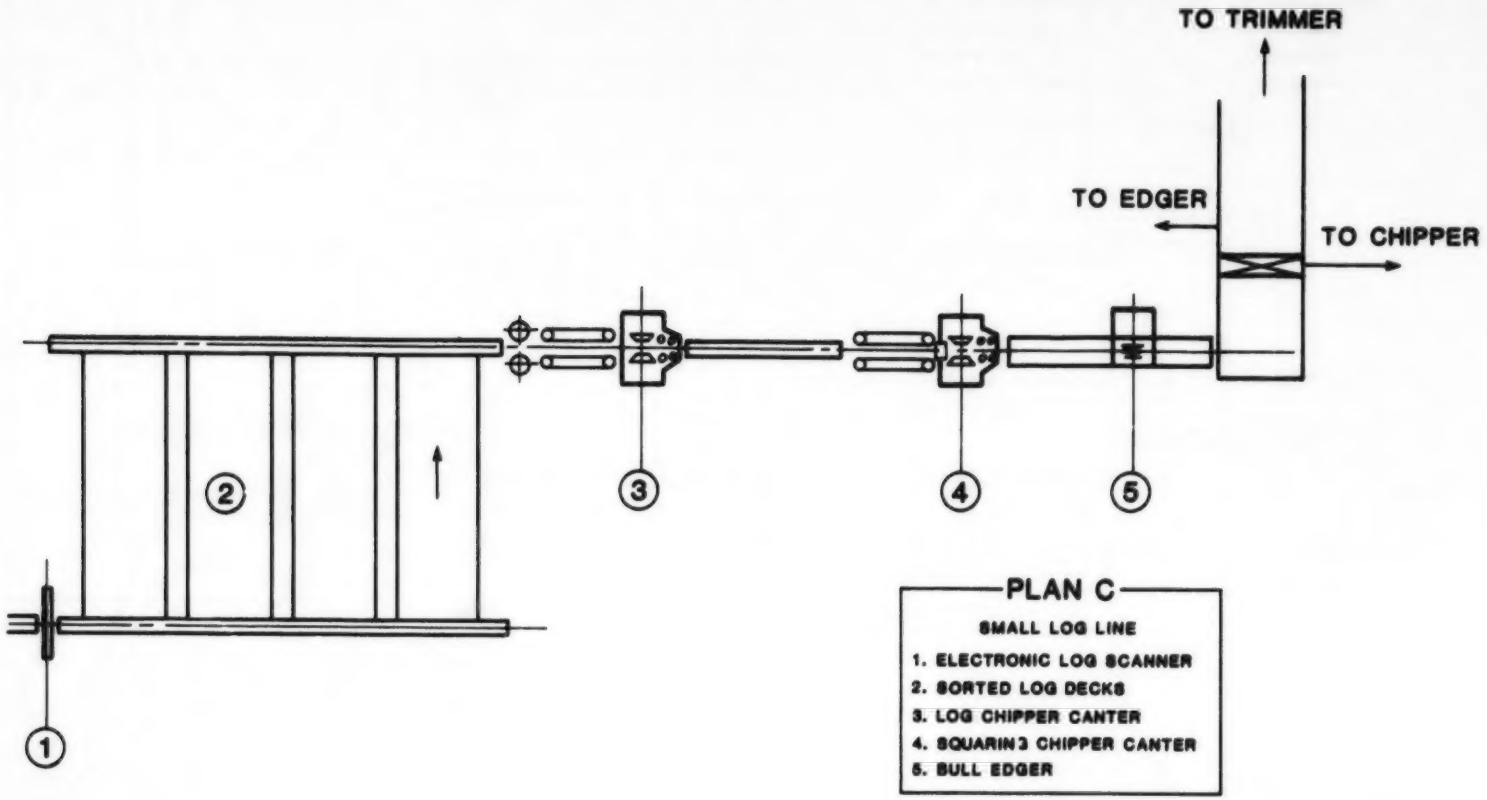
PLAN A

1. KNUCKLE BOOM
2. LOG SLASHER
3. DEBARKER
4. LOG TWIN BAND
5. HORIZONTAL BAND RESAW
6. CANT SLASHER
7. COMBINATION EDGER
8. TRIMMER
9. CHIPPER
10. CHIP SCREEN
11. FILING (BASEMENT)
12. ELECTRICAL CONTROLS



PLAN B

1. KNUCKLE BOOM	7. EDGERS
2. LOG SLASHER	8. TRIMMER
3. DEBARKERS	9. CHIPPER
4. LOG CANTER-TWIN BAND SAW	10. CHIP SCREEN
5. HORIZONTAL BAND RESAW	11. FILING
6. CANT SLASHER	12. ELECTRICAL CONTOLS



PLAN C

SMALL LOG LINE

1. ELECTRONIC LOG SCANNER
2. SORTED LOG DECKS
3. LOG CHIPPER CANTER
4. SQUARING CHIPPER CANTER
5. BULL EDGER

How to Saw Hardwoods

F.J. Petro, Frank J. Petro Consultants Inc.

To do justice to the topic "How to Saw Hardwoods" I am going to confine most of my remarks to the processing of hardwood sawlogs 8 to 16 feet long into furniture lumber (factory lumber) and other end-use products.

Since an appreciation of how hardwood factory lumber is graded is important in sawing hardwoods, I will briefly discuss this subject in order that you may better understand some of the processing procedures that I expect to mention later in my talk.

To appreciate how hardwood lumber is graded, I am going to first provide a comparison with the grading of softwood lumber.

Most softwood lumber graded by the NLGA (National Lumber Grades Authority) rules is primarily used for construction purposes and it is graded on a **defect basis** in which the size, frequency, and nature of defects governs each grade.

Since end-use requires material that meets certain strength criteria, the factors influencing strength, such as wood density, and the size and location of knots are extremely important. Further, softwood lumber is dressed four sides and is usually used as is of full length, width and thickness. It is also sawn to stock widths.

On the other hand, hardwood lumber graded by the NHLA (National Hardwood Lumber Association) rules is usually remanufactured and is graded on a **cutting yield basis.** This system takes into account the size, percentage yield and number of clear face (defect-free) or sound cuttings or pieces that can be obtained from a board when it is cut up into such items as furniture parts (components), strip flooring, pallet parts, crating stock, etc.

Size and condition of defects for the most part do not govern the grades of hardwood factory lumber. There are some exceptions, but I will not mention these. Defects are usually eliminated (cut-out) during the remanufacturing process. Also, hardwood lumber is mostly sawn to random widths (i.e., inches and fractions of an inch), is trimmed to the full foot plus overlength and, is usually sold rough (NO DRESSING).

The standard grade names of hardwood factory lumber are FAS, SELECTS, NO. 1 COMMON, NO. 2 COMMON, NO. 3A COMMON and NO. 3B COMMON. These grade names would apply to the species, white birch, yellow birch and trembling aspen indigenous to Newfoundland.

The standard lengths are 4 ft., 5 ft., 6 ft., 7 ft., 8 ft., 9 ft., 10 ft., 11 ft., 12 ft., 13 ft., 14. ft., 15. ft. and 16 ft. However, in any shipment of lumber graded by the NHLA rules, not over 50 percent of odd lengths can be admitted.

The standard nominal thicknesses for rough lumber are 3/8 in., 1/2 in., 5/8 in., 3/4 in., 1 in., 1-1/4 in., 1-1/2 in., 1-3/4 in., 2 in., 2-1/2 in., 3 in., 3-1/2 in., 4 in., 4-1/2 in., 5 in. and 6 in.

Except for the minimum nominal widths mentioned in the rules i.e., six inch for FAS, four inch for SELECTS and three inch for the COMMON grades and any stock widths (i.e., pallet lumber, flooring lumber, etc.) factory lumber is cut in random widths. Unlike softwood lumber, tapered boards are permitted in shipments of hardwood lumber.

Since hardwood lumber is used for many purposes, the quality requirements of cuttings vary according to grade and species. In the NHLA rules there are two principal types of cuttings described. One is clear face cuttings and the other is sound cuttings.

A clear face cutting is defined in the rules as a cutting with one clear face (ordinary seasoning checks admitted) with reverse side sound as required in sound cuttings. And, a sound cutting is defined as one that is free from rot, pith, shake and wane. It will admit sound knots, bird pecks, stain, seasoning checks which do not materially impair the strength of a cutting and pin wormholes. Other larger holes 1/4 in. or more are admitted within certain limitations. The reverse side of the cutting also has to be sound.

In processing hardwoods, it is desirable to produce a combination of product sizes in order to maximize lumber recovery. Although such factors as available markets, log size, log grade and type of equipment available will have an influence, sawmill profitability can be improved when a range of products are produced.

Standard factory lumber should be manufactured in a range of thickness dimensions from 4/4 through to 8/4 with emphasis on the thicker stock. Low grade logs and low grade hearts of better quality logs should be converted into products other than factory lumber. The initial outer cuts of low grade logs should be manufactured into one-inch boards in order to "size-up" the log for the production of thicker stock material more than two inches.

The larger thick stock material should be recovered from low grade logs, and smaller thick stock material from the hearts of better quality logs. Factory lumber should also be produced in the full range of lengths (down to four feet) as called for in the NHLA rules. If a market exists for lumber thinner than one inch then such a thickness should be produced by resawing slabs. A number of sawmills known to the author resaw slabs into 1/2-inch crating lumber. Apparently, this material is worth five times more than an equivalent volume of chips and it improves recovery of solid wood products.

In developing the best possible grades of factory lumber from logs, it is essential to have a good working knowledge of the hardwood lumber grade rules especially the defect limitations. For those who are unfamiliar with the hardwood lumber grades, a simplified method of learning the basic principal can be found in the publication "How to Edge and Trim Hardwood Lumber". This publication is available from Forintek Canada Corp.

In sawing for grade it is important to recognize that defects such as knots, holes and bumps on a log face will occur in about the same place on a board

sawed from that face. Surface defects are actually indicators of the grade of lumber that may develop from that face.

It must also be recognized that once the first face is selected, the positions of the remaining three faces are fixed and the potential grades of lumber are established for the whole log. Obviously, one cannot change the location of the defects in order to get better grades, but one can select the sawing faces on the log so that as many defects as possible are located at the edges or corners where they can be edged off.

This is one of the most important principals of sawing for grade. Thus, before sawing the sawyer should observe where all the defects are on a log and then he should position it in such a way as to minimize their effect on lumber grade in as many faces as possible.

Slabbing cuts should also be kept as thin as possible, consistent with producing the minimum-width faces required for certain products and grades, e.g., 6-1/2 in. for FAS, 4-1/2 in. for SELECTS and 3-1/2 in. for the COMMON grades. As a rule-of-thumb, when slabbing the minimum FAS width (6-1/2 in.) should be exposed in logs 12 in. and over in diameter and the minimum selects width (4-1/2 in.) in logs under 12 in.

The common grade width (3-1/2 in.) should be exposed in logs smaller than 12 inches whose faces promise lumber no better than No. 1 Common. In producing 4-in. Selects, it is often wise to slab at least 5-in. wide to avoid possible conflict with the stringent wane limitations of 4 and 5-inch selects.

There are three basic methods of sawing hardwood logs. These methods are sawing around, cant sawing and live sawing.

Grade sawing usually entails progressively sawing around the log and this procedure is generally known as "Around Sawing". To accomplish this, the poorest face should be slabbed first and then turned to the knees and dogged. The better faces are then sawn deep, however, care should be taken not to sacrifice the potentially higher grades of lumber promised by adjoining good faces. As a rule-of-thumb, when the sawn face drops to No. 1 Common and the adjoining face promises FAS, the log should be turned.

An alternative sawing method commonly used throughout the industry is the "cant sawing method" or "modified live method". This procedure involves the sawing of two opposite faces to a fixed cant dimension then sawing the remaining two faces to the final dog board.

Of course, in other cases this procedure can be changed when either of the first two faces sawn promise better grade lumber. This sawing method is ideal when longer dimension structural products are being produced from the low grade hearts of logs.

A third method of sawing is known as "Live Sawing" which involves the complete breakdown of a log in a single sawing plane. Although this method was once popular in processing small diameter low quality (knotty and crooked) logs quickly, it is practiced less today because of market demand for timber products.

The functions of edging and trimming are just as important in a mill as sawing. It is the sawyer's responsibility to establish the potential grade of a board and then for the edgerman and trimmerman to edge and trim the board in such a way that its value is maximized. To achieve optimum performance, it is essential that they also have a working knowledge of the NHLA rules especially the defect limitations for the grades of FAS, Selects and No. 1 Common.

They must know length and width requirements of the various grades, admission of certain defects and any special rules or instructions requested by the customer, etc. Also, if they have a working knowledge of the rules, they will know when to grade rip or to crosscut a board to increase overall board value.

For those involved in hardwood processing at the present time or who are considering establishing a hardwood mill, the publication entitled, "How to Edge and Trim Hardwood Lumber" should be very helpful in producing the highest possible value of hardwood lumber.

There are no hard and fast rules that can be followed for every situation in sawing for grade. This naturally follows because of the many variations in defect characteristics encountered between logs. However, a number of guides have been developed over the years by the U.S. Forest Service which should prove useful to the sawyer. These are listed and discussed as follows:

- When a high grade face is opposite a low grade face, the good face should be sawn parallel to the bark with the poor face presented to the saw first. The basic reason for sawing the poor face first is to give the log a firm bearing for the sawing of accurately cut lumber from the opposite good face. By so doing, the log is automatically squared up when the log is turned 180° and the good face presented to the saw. Long full length lumber will result, making the need of using taper offsets unnecessary.

- Because the outer part of the log usually contains the highest quality material, it is recommended that one inch lumber be sawn first from this region. The primary reason for doing so is to minimize the amount of clear sap material which would be lost as edging waste.

- Subsequent boards, however, should be thicker than one inch from the face being sawn providing the grade is being maintained or that it has not dropped more than two grades than promised by adjoining faces. It is suggested that this practice be followed especially in larger logs in order to take advantage of the premium paid for thicker stock in the top grades of hardwood lumber.

- Defects such as knots, bumps, etc., should be oriented on the edges or corners of sawing faces or as many as possible contained on one face.

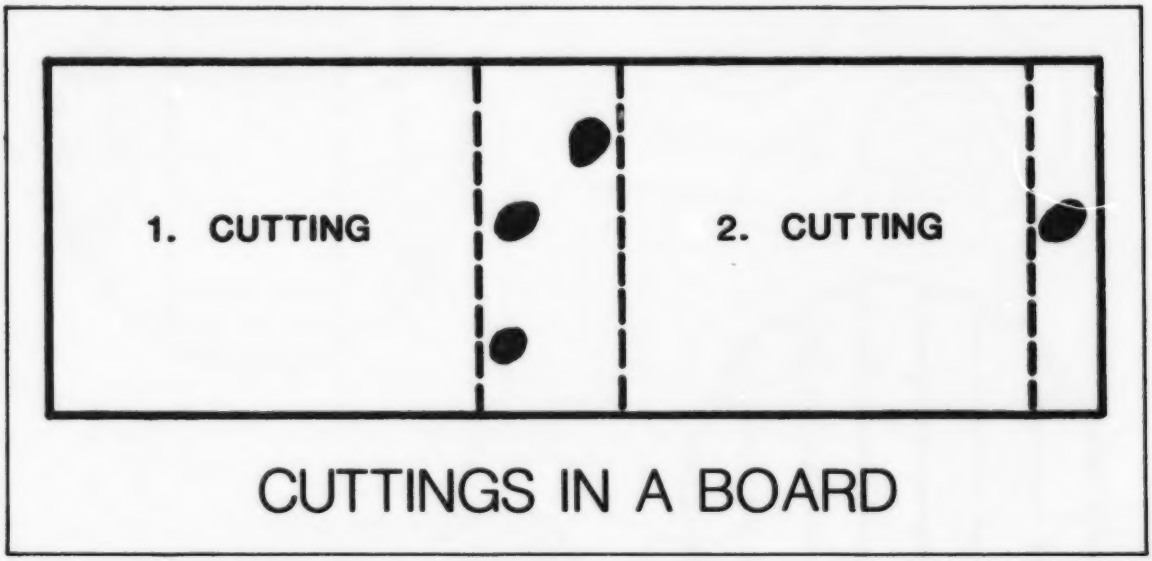
- Care should be exercized in choosing and using turning and dogging equipment because much good lumber can be damaged and degraded.

- When straight seams and cracks are present, the logs should be oriented so that they are located as close to the board edge as possible to facilitate removal by edging. The same applies to knot defects which are concentrated in a line parallel to the length of the log.

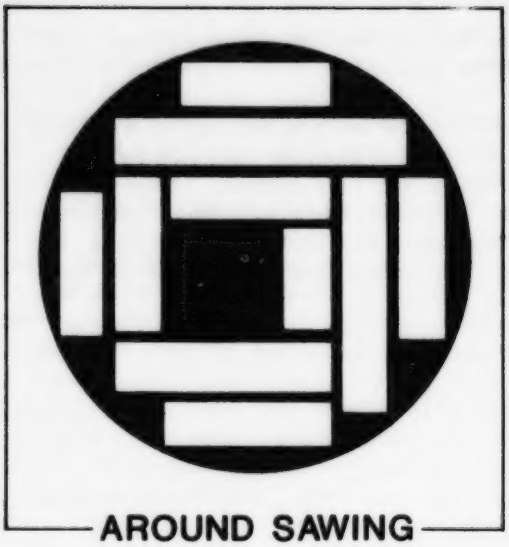
- Spiral seams should be contained within as few faces as possible. A light slabbing cut is taken on the face most affected, which is then turned to the knees for deep sawing of the opposite unaffected face.

- Logs with considerable heart rot and shake should be sawn around, so that the defective portion is isolated for easy disposal.

- And lastly, better quality logs with sweep should be presented to the saw with the horns in or out and sawn just enough to remove the horns and belly, leaving two faces suitable for resting on the bunks. Then the other pair of opposite better faces should be sawn deeply. Poor quality logs with pronounced sweep should be dogged securely and sawn as fast as possible irrespective of face orientation. Live sawing is the best and fastest method.

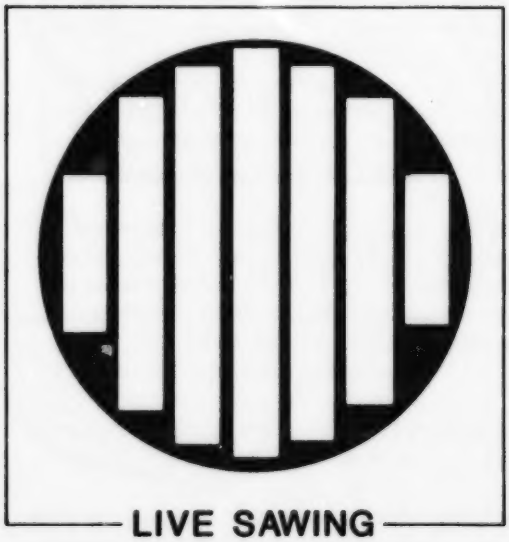


CUTTINGS IN A BOARD



AROUND SAWING

CANT SAWING



LIVE SAWING

Cost Saving Modifications at Minimum Cost

W.A. Tropper, Forintek Canada Corp.

As the result of increasing resource costs and decreasing wood size and quality, there is a need to upgrade sawmill facilities and operations if owners wish to remain viable in the ever-increasing competitive lumber industry.

In order to improve profitability, mills must increase volume and value recovery per log and by the same token reduce the time required to convert a log (increase productivity). In other words, more end products have to be squeezed out of a log at a faster pace. To do this, several new and not so new devices and methods are available. This paper will deal with some low cost options to improve sawmill efficiency and profitability.

In other words, the bottom line of the exposé is to show you how you can make or save more dollars in areas we, as a sawmilling group, have found during our studies of 80 hardwood and softwood mills in Eastern Canada. Usually when conducting a sawmill study our group surveys the whole conversion process of wood starting from the bush operations and finishing at the sorting table or planer mill, depending on the end product marketed.

Two possible areas for improvement have been identified:

- quality of the resource and raw material
- efficiency of the conversion facilities.

Quality of the Resource

Carefully manufactured logs result in increased recovery and productivity. Once in the mill there is no way to improve a log without incurring costs and wasting valuable processing time. Thus, it makes economic sense to insure that good log making practices are followed.

As an example let's analyze the impact of overlength on a log. Let me define what we mean by log length and overlength.

> **Log length.** Here we are speaking of producing the correct log length for the lumber sizes marketed. In other words, producing the correct nominal length log plus the minimum trim allowance required.
>
> **Overlength** is any length in excess of the sum of the nominal log length plus the required trim allowance.

To illustrate what we mean we have the case of the mill selling softwood lumber on the even foot (8-10-12-14-16 feet). Measuring the logs we find a log cut 12 feet 9-1/2 inches. In this case, the log should have been cut 12 feet 5 inches. As cut, this log has 4-1/2 inches of overlength. Another log is 11 feet 10 inches; this log length is not desired. In this case, the overlength would be 11 feet 10 inches minus 10 feet 5 inches.

This is an extreme example but logs such as this have been encountered which are bucked just short of the nominal length are especially detrimental because lumber must be trimmed back to the nominal length which is usually two feet. This represents a 12.5 percent loss on 16 foot lumber. Excessive overlength and improper log length are costly.

Firstly, lumber recovery is lower from these logs as this extra length is usually trimmed off and chipped. No additional lumber is produced from the overlength, just expensive residue.

Secondly, this extra log length consumes expensive processing time without producing any additional lumber. This reduces throughput and increases processing cost per log.

Studies conducted by Forintek in mills with debarkers identified several costly practices, namely:

- pencil sharpening
- debarking gouges
- excessive debarking.

These types of debarking mishaps usually decrease the potential lumber recovery and limit the use of the outer jacket of logs. A lot of money can be made or lost at the debarker. Too much bark in the chips and you lose the premium or worse yet the chip contract. Too much fiber removed reduces the recovery of potentially valuable lumber. Complicating this matter is the desire to increase lumber recovery. If we increase lumber recovery, less wood fiber will end up as chips from a given tree volume. If debarking efficiency does not increase at the same time then the relative percentage of bark will increase in the chips.

There is a fine balance here between too much and not enough. If we haven't achieved this balance how much can it cost? We used the Best Opening Face (BOF) computer program (or usually referred to: U.S. Forest Service Developed Conversion Program for optimizing lumber recovery) to simulate the effect of log diameter reduction due to excessive debarking. A 6.4 inch diameter log, 12 feet long with two inches of taper should yield 27 FBM of lumber if the log is sound and straight (this is based on the BOF sawing solution for split taper, log and cant sawing and a 1.875 inch target size) according to their program. If the debarker removes a tenth of an inch too much of good fiber that same log would yield 11 percent less lumber.

Efficiency of the Conversion Facilities

The next major area where improvements are possible is the sawmill. Four major factors have to be controlled, they are:

- downtime
- delays
- recovery
- processing time.

In summary let me say that these few guidelines on mill design will result in a reduction of costly downtime and making more time available to process saw-logs.

Operator Aids

Other mechanical devices are designed to reduce time required for decision purposes and by the same token increase recovery. These devices are called operator aids. In essence every time a conversion center operator picks up a piece, a decision has to be made concerning the best way to position and process the piece. Aids such as laser light and shadow light guide lines at the headsaw and at secondary conversion centers usually help operators to position pieces for best breakdown, higher grade and greater volume of lumber is produced and this at a faster rate. Also you have maximum usage of raw material.

Other aids you may wish to consider include mirrors at the headsaw, pop-up saws at the trim tables, return conveyors to the edger or resaw, automatic set works at the headsaw, metal detectors at the chipper and plated-in surge tables. These devices can increase recovery, value and productivity, because they reduce operational and decisional delays and unify wood flow.

Throughput Process

What is meant here by throughgput process is the way logs are processed in the mill. Again according to our studies and findings some owners do not know how to evaluate the profitability of processing lower quality material.

This section will deal with:

- which logs should be sawn
- how they should be sawn
- how much time should be spent sawing.

Knowing the profit potential of sawlogs prior to sawing is important to remain viable and competitive. It has been found that every class of log has its different breakdown procedure based on its small end diameter, quality and length. You surely realize by now that proper log-making practices ensure that only desired material is processed and not excess stuff which reduces profitability due to longer processing consumption. The profitability of logs is determined in the following manner:

> To determine costs, the delivered costs of wood (bush operations, log manufacturing costs, hauling costs, etc.) are added to the conversion costs (electricity, manpower, depreciation of equipment, insurances, office costs, etc.); ... then
>
> you determine the prices you get for all end products (lumber, chips, sawdust, bark, firewood, etc.). Once all values are determined per log class (diameter, length quality, etc.) you subtract value from cost to either obtain profit or loss. Then all these values are brought back on a per thousand board feet basis for comparison purposes.

'Downtime' is infrequent long duration mechanical problems or stopages which disrupt production. 'Delays' are short and repetitious stops in production that can seriously reduce effective production time when you add them up. The following displays areas where improvements are possible:

- mill design
- operator aids
- throughput process
- controls (break-even log), LSP
- mainenance
- training

Mill Design

For the purpose of this paper, we will refer to mill design as the mill layout and material flow.

The general rule is that the headsaw should be the conversion center which governs productivity of the production line or of the whole mill, in the case of a single-line mill. When controlling the rate or pace of production all other conversion centers should have excess capacity of production to meet the requirements or pace imposed by the headrig. This will eliminate the occurrences of bottlenecks that reduce productivity in the mill.

I do not mean by this to reduce the pace of the headsaw. I mean that the secondary conversion centers should have excess production capacity. Mill managers should ensure that every secondary conversion center has sufficient surge space in order to accumulate incoming pieces. In this manner the occurrence of minor breakdowns or delays should not reduce the pace set by the headwaw.

Also, in previous studies, chains, conveyors and roll cases have proved to be faulty at times. So it is recommended that chains, conveyors and roll cases be suitable to transport the smallest size produced. This is extremely important because transport systems are responsible for a significant portion of the repetitive production delays (jams). These delays can accumulate over a shift and significantly reduce production. As an example, the average amount encountered in our SIP studies usually varies from three to eight percent and delays from seven to eight percent. Therefore, can you imagine how many more logs you could process for the same amount of money?

Also the implementation of lumber singulators reduce handling delays associated with lumber jams was recommended for some mills studied having a fast headsaw output.

As you probably realize by now the whole idea is to have a smooth flowing operation where the headsaw governs the production rate. Attempts to increase productivity should be done here. For example, the addition of an automatic stop and loader and log turner could increase production by as much as 35 percent. This addition, costing about $8,000 (ball park price) should pay for itself in less than six months. Also this implementaton reduces conversion costs because one man less is needed. When increasing productivity at the headsaw, make sure that you have the required capabilities of production everywhere else in the mill.

As your realize, some logs are profitable, others marignally and the remainder are unprofitable to process. Furthermore, the values are the maximum price you can pay for a log at the breakeven level. This sort of breakdown analysis is useful for both hardwood and softwood sawmills in determining which logs to chip, which logs to process fast (to get off the headsaw in a hurry) or which logs can be grade sawn to ensure maximum yield of value is produced.

Furthermore, indications are given concerning trees which should not be exploited at all, because in some cases it is better to pay fines or sell the fiber as pulpwood or firewood than to process these logs in your mill. In doing so, you maximize your profit.

Furthermore, determination of the breakeven log shows you how to allocate different log sizes in a multi-production line system. Log sizes not profitable on the large log production line should be processed on a higher speed single pass small log system (e.g., twin circular headrig). I would like to point out that log size is sometimes irrelevant because excessive sizes can be unprofitable due to mill limitations.

A case like this happened in one of the mills we studied. This mill consumed too much time breaking down large logs. So, a profitable log does not always imply a large log. As you realize proper log allocation with a breakeven log, analysis increases productivity because marginal logs and non-profitable logs are processed faster--making them more profitable. Also, recovery is increased because less fiber-consuming cuts are made to the less desirable logs in order to hasten their exit from the conversion line.

One other way to increase profitability of logs is to find markets for your residues. For example, slabs not fit for further breakdown could be transformed into firewood. One final comment I would like to add is that the breakeven marking can be lowered with better equipment, mill layout and operator aids. These devices as demonstrated earlier reduced processing time consumption hence profit margins can be increased. They can also be increased with training of manpower. I will discuss this topic later.

Controls - Maintenance

Controls in the mill such as the lumber size and the breakeven log analysis are designed to monitor sawing performances. These controls pinpoint faulty areas, and insure a more viable maintenance program. I mean by this that a maintenance program implemented with controls will surely depict those undetected areas that are about to fail, thus recovery and productivity are not sacrificed.

Controls such as a lumber size program and the breakeven log analysis are designed to monitor sawing performance. The devices monitor just about all sawing parameters (log processing rate, recovery, downtime, delays). They pinpoint faulty areas and insure a more viable maintenance program, because variations occur in the monitoring of sawing parameters. Thus, a maintenance program implemented with controls will depict undetected faulty areas in the mill. Hence, productivity will not be sacrificed.

An astonishing percentage of mills studied by our company so far, do not sustain a regular maintenance program. The crisis approach is usually applied. When a major breakdown occurs, only then will faults be repaired--overlooking other potentials for downtime. As you realize, valuable production time is sacrificed. To keep a mill running in top condition requires continual maintenance to ensure that every piece of equipment functions as intended. Regular servicing and inspection should be performed at each transformation center on a regular basis. The following tasks should be done on a daily basis (or after every shift):

- check hydraulics (pumps, hoses and seals) for leaks
- check generators for overheating
- inspect all saws
- grease bearings and shafts
- inspect conveyor belts and chain linkages
- keep every log breakdown center free of sawdust and other residues.

As a result of the preceding, better productivity and better products can be achieved.

Training

Personnel are another important factor in the profitability of a sawmill. One single operator decision can either make or break productivity and recovery of a sawmill.

As an example, in mills studied so far, serious edging and trimming mishaps have been noted. The best value of boards was not achieved due to the fact that operators were not aware of grading rules. In one case, a trimmer operator in a hardwood mill was producing the longest boards possible instead of crosscutting to maximize value. In another case, again in a hardwood operation, pieces produced at the edger were seriously downgraded because wane allowances were not respected or production was sacrificed because pieces were heavily edged.

Furthermore, in softwood mills studied so far, trimmer operator mishaps occurred 12 percent of the time or in one board out of eight. On the other hand, the headsawyer at one mill took his time to grade saw hardwood logs which produced, at best, 30 percent No. 1 common and better. If he was aware of log grading specifications this worker would have been able to recognize the potential of logs. Thus valuable production time would not have been sacrificed for the sake of a couple of non profitable high value pieces.

Hence, it is recommended that all your operators be familiar with log grading rules and lumber grading rules.

Conclusion

I would like to finish by outlining that there is no doubt in my mind that there are very good mills out there. However, as everywhere else in Canada, continuous upgrading of actual facilities is a "must" if one wishes to remain in business.

You might be making money now, but you probably could make more and who is to say that this will always be the case. Hence, can you afford not to implement solutions proposed in this presentation?

Federal Business Development Bank Overview

D. Pelley, Federal Business Development Bank

The Federal Business Development Bank, or FBDB, is a Crown Corporation which provides both financial and management services to supplement the support available from the private sector. It came into existence following the Second World War under the name of Industrial Development Bank and, due to a greater concentration with smaller and medium size businesses, became the Federal Business Development Bank in 1976. We have approximately 100 branches across Canada, three of which are situated in the province of Newfoundland. The Bank offers, through its Management Services Division, a wide variety of seminars, courses, management clinics, and publications designed to help business people in the day-to-day skills required to run a business. As we know too well, the recent experience with inflation caused many business failures and, according to studies conducted by such organizations as Dun & Bradstreet and the accounting firm of Thorne Riddell, the majority of failures are still credited to improper or ill-equipped management.

Learning the technology of producing a good product is no longer enough. We must plan now to produce so that operations will provide profits sufficient to provide a living to the owner, meet all bills and create a reserve for the future needs of the business. As you are no doubt aware, a favorable trend exists in the Newfoundland lumber industry, in that more and more retailers of building materials are beginning to favour local lumber versus mainland lumber. This is the direct result of increasing the quality of the product. In order to capitalize more on this trend, we must be able to compete with mainland producers on other matters such as price, service, etc. This will require close scrutiny of costs involved, the efficiency of our operations, reliability of the customer, and knowing the daily financial situation of your operation. Sawmilling is a business and must be thought of in business terms. It is necessary, then, to equip ourselves with the business management skills.

The FBDB, to assist in this matter, also offers management counselling through what we call our C.A.S.E. program. This program makes successful retired business people in many areas of specialization available to small and medium businesses at very reasonable costs. These individuals will assist you to make necessary changes to your operations or virtually any aspect of your business which requires attention. Their success record is quite admirable and, should you find interest in this program, contact Mr. Gerry Myrden, our Western Newfoundland Co-ordinator, at his office on the 1st. floor of the Herald Towers, Corner Brook.

In addition, the FBDB offers a wide variety of financial services to businesses when they cannot obtain financing elsewhere on reasonable terms and conditions. It can make its funds available on flexible terms both through term lending and through equity investments. We now offer term loans with the interest rates fixed for periods of one, two, three, or five years as well as a daily floating rate which can be switched to fixed rates at the customer's request. The term loans we extend to customers allow them to acquire fixed assets such as land, buildings, machinery, and equipment but we also provide

working capital loans, loans to finance changes of ownership, and some refinancing.

The requirements for loan authorization are the standard items with which you are no doubt familiar. We measure the management and its prospects for managing an operation successfully in the future. Evidence of management ability can usually be seen from how things have been managed in the past. If shortcomings exist, we want to know how management will correct the situation.

The second criterion is level of earnings. We look at the level of earnings over the past number of years together with trends which are noticeable in areas such as sales, expenses, profits, etc. Additionally, we look for factors which will affect earnings in the future. A business has to be viable for our participation.

The third criterion is equity. This would represent the commitment to the business on the part of its owner. The owner or owners must be committed to the business and share the risk.

The fourth and last item is security. The FBDB must attempt to recover any monies lent so that, as other lenders, we would take security on the fixed assets of that business so that, should it fail, some or all of our funds would be recovered through the sale of assets.

We spoke earlier about a necessity for management training and a favourable trend in local lumber production. To this I would like to add the fact that in recent years the majority of new jobs in this country have come from small business operators such as yourselves. In this respect, the economic future for small business is not a bad one; however, it will very likely not be a very easy one either. There is always a high risk attached to business and it is through the management skills of owners that we may expect to reduce risks.

We must plan the future, keeping such factors in mind as identifying the market and the competition, financial planning to reorganize debt as well as planning your output capacity, possible expansion, the human resources required and how to get the most from your existing employees, and such things as the extent to which future automation will affect your business.

In summation, then, as owners and managers of small and medium sized businesses, our futures can be made more attractive by equipping ourselves with the necessary management tools, being aware of the business situation, and careful planning.

Department of Regional Industrial Expansion Assistance Programs

A. Davis and D. Murrin, Department of Regional Industrial Expansion

We would like to share with you some of the problems and concerns expressed by individuals associated with the timber industry and then follow with an outline of the types of support offered by the DRIE to combat such inadequacies as referenced.

Building Supply Dealers

Comments expressed included:

- inconsistent quality
- lack of continuous supply
- unplanned; un-cut (i.e., below 6 x 6-in.) lumber necessitating the buyers to finish product for resale
- length of lumber produced
- size selection
- seasonality of small sawmill operations
- direct selling of lumber to public from sawmill operations.

Sawmill Operators

From their viewpoint, problems arose from the:

- increased number of new sawmill operator licenses
- lack of adequate timber stands in their immediate area
- dumping of mainland product on Newfoundland market
- reduced demand by public for lumber products
- obsolete equipment
- incapacity to properly dry hardwood
- high operating costs.

Local Consumers

Comments expressed concerned:

- quality of Newfoundland lumber products
- price of Newfoundland lumber products versus mainland competitors
- variety of Newfoundland lumber products (i.e., species and size).

Industry Analysts Innovation

Problems appeared to stem from:

- inaccessibility of resource (i.e., concentration)
- lack of provincial regulations to ensure an integrated logging system of production

- primary provincial focus on pulpwood production
- no regulations or utilization standards for hardwood
- lumber markets restricted by small log sawlog size and species available
- lack of kiln-drying capacity to enable the development of a woodworking industry utilizing local hardwoods
- fragmentation of the industry with many sawmills distributed widely throughout the province, especially in coastal areas
- inadequate sawmill industry assistance.

On the subject of **sawmill industry assistance**, I would refer you to two programs currently administered by the Department of Regional Industrial Expansion:

IRDP: Offers support to the sawmill industry through the provision of grants directed at:

Innovation

To encourage the development of new products, processes and increase industrial productivity.

Consultant studies; development of new products or processes; technological capability; development and demonstration; design. ——— 75%

Establishment

To provide for establishment of new production/tourism facilities.

Consultant studies. ——— 75%
Establishment. ——— 60%

Modernization/Expansion

To increase industrial productivity through improvement, modernization/expansion.

Consultant studies. ——— 75%
Modernization/expansion. ——— 50%
Adaptation of microelectronic/electronic technology. ——— 75%

SMALL BUSINESS INCENTIVES PROGRAM

Rural Development Sub-Agreement:

Business and Economic Development Fund (Incentive Grants)

To provide assistance for the establishment, modernization/ expansion of manufacturing or processing operations as well as for industries utilizing primary resources (e.g., farming). However, forestry and fisheries are excluded with agriculture and mining included.	50% of ECC for maximum of $25,000 federal grant

Under each program, a formal application for financial assistance must be filled with sufficient information provided to enable an evaluation of the potential viability of the project in question.

Some of the more general information usually required would include detail on:

- corporate ownership and related companies
- resume's of key management personnel
- why project is being undertaken and reason for DRIE assistance being requested
- outline of net economic benefit of the project
- detailed project costs
- marketing data and organization strategy (area of distribution, major customers)
- capacity of operations, proposed and existing
- availability of raw material resource
- jobs to be created
- environmental applications
- financial data--pro-forms, financial statements, personal net worth
- identification of consultants. Case breakdown.

Further: Eligibility under both programs is open to individuals, proprietorships, partnerships, cooperatives, non-profit organizations, etc.

Threshold entry levels basically enable support to 50 percent of a maximum $50,000 capital cost investment under the Small Business Incentives Program with IRDP support obtained on projects above this size. It should be noted that the level of support under IRDP varies with the type of project, the economic benefits returned to the area and the overall level of departmental support required to enable a viable operation.

No prior commitment of any project costs is permitted under DRIE programs. Any costs incurred prior to the departmental approval date for the project will not be eligible for support and may disqualify the project from any support at all.

A 20 percent level of equity (free and clear personal ownership) is required in the project.

Project payment varies under each element and each program. Fifty percent of the non-repayable grant is provided on projects with 50 percent completion

under the Small Business Incentives Program, the remaining 50 percent paid out upon completion of the project. Here, a three year monitoring period also exists to assess overall performance and job creation.

Under the IRDP program bridge financing of the project is generally required by the applicant since the initial payment of 90 percent of our share of projected costs is not released until after the operation has been in commercial operation (i.e., utilizing and building, equipment, machinery, etc., pertaining to the project) for at least 30 consecutive days. Ten percent holdback is held for two years from the CP date and released upon expiration of the two year period.

Support levels under the IRDP program will vary from one percent to the maximum available under the program's element against which the project is based. Generally speaking, the kind of support is non-repayable grants within the range of 30 to 50 percent of capital investment in the project.

All projects must demonstrate potential commercial viability, contain significant national or regional economic benefit and represent projects that would not proceed without program support.

The information provided provides some basic information on the kind of support that is offered by DRIE in aid of the sawmill industry. While it is certainly inadequate to cure all the ills of the industry, it should provide an initial step in this endeavour and if utilized in concert with the will of the industry, could result in a more efficiently run lumber business for Newfoundland.

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Name	Title	Affiliation
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Gilbert Ash	Owner	Gilbert Ash Sawmill Portland, Nfld.
Lee Burden James Burden		Bonne Bay, Nfld.
Eric Davis Keith Powlow	Forestry Technicians	Dept. of Forest Resources and Lands Pasadena, Nfld.
Bob Dingwall	Partner	Jamestown Lumber Co, Ltd. Jamestown, Nfld.
Donald Elliott	Sawmill Owner	Elliott Enterprises Gander Bay, Nfld.
Baxter Elliott, Jr.		Osmond's Sawmill, Ltd. Millertown, Nfld.
Mark A. Fry	Partner	Jamestown Lumber Co., Ltd. Jamestown, Nfld.
G. Halfyard	Owner	Wiltondale Lumber Co. Bonne Bay, Nfld.
Patrick Keough		Greenforest Products Bonavista South, Nfld.
Douglas Lake	Owner-Operator	Lakefield Farm Bonavista Bay, Nfld.
Eric Osmond		Osmond's Sawmill, Ltd. Millertown, Nfld.
Stanley Parsons		R. & S. Enterprise Grand Falls, Nfld.
Loyd Piercy Dave Gibbos	Manager Manager	Main Brook Lumber Co. White Bay N., Nfld.
Van Saunders		Saunder's Ent., Ltd. Nfld.

Name	Title	Affiliation
George Sexton Marvin Coles Jim Harris		George Sexton, Ltd. Bonavista Bay, Nfld.
Harold Sheppard	Owner	Harold Sheppard, Ltd. Point Leamington, Nfld.
Scott Short	Grading Supervisor	Nfld. Lumber Producers Association Bonavista Bay, Nfld.
Norman Smart		Sweetapple and Smart Glovertown, Nfld.
Edward Stewart	Forest Engineer	Forest Resources and Lands Pasadena, Nfld.
Ernest Strickland		Glenwood Forest Products, Ltd. Glenwood, Nfld.
Lloyd Stuckless	Manager	Glenwood Forest Products, Ltd. Glenwood, Nfld.
Anthony Sutton	Owner	Cormack Wood Works Cormack, Nfld.
Don Wells	Partner	Wells Bros. Cormack, Nfld.
Tate Wight		Nfld.